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PINEAPPLE FARMS ON THE NEAR NORTH COAST.

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Contents

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	Page.
The State of Agriculture—	
Whither the Weather? By C. W. Winders	295
Pastures—	
Pasture Improvement on the Mary Valley Alluvial and Coastal Hillside Soils.	
By G. J. Cassidy	297
Horticulture—	
Pineapples Need Plenty of Potash. By R. C. Cannon	313
Progress in Banana Leaf Spot Control in North Queensland. By W. Pont	317
Liming and Trace Element Problems in the Bean Crop. By L. G. Trim ..	327
Weeds—	
Stinkwort, a Weed New to Queensland. By S. L. Everist	331
Dairying—	
A Convenient Milk-vat Stand. By R. Hartwig	334
The Profit and Loss of Concentrate Feeding. By A. Hutchings	337
Pig Raising—	
Deep-litter Pig Pen Demonstration. By G. Sjoquist	339
Agricultural Statistics—	
Agricultural, Dairying and Pastoral Statistics—Why They are Needed.	
Contributed by the Government Statistician's Office	343
Marketing—	
A General Review of Primary Producers' Co-operatives in Queensland.	
By D. R. Lewis	352

Editor: C. W. Winders, B.Sc.Agr.

Brucellosis-Tested Swine Herds

(As at 31st May, 1957).

Berkshire.

A. P. and N. Beatty, "Deepdene," Baramba road, Nanango
S. Cochran, "Stanroy" Stud, Felton
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
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F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
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H.M. State Farm, Numinbah
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L. Puschmann, "Tayfield" Stud, Taylor

C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. McLennan, "Murcott" Stud, Willowvale
C. F. W. and B. A. Shellback, "Redvilla" Stud Kingaroy
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
M. F. Callaghan, Lower Mount Walker, *via* Rosewood
E. R. Kimber, Block 11, Mundubbera
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J. W. Bukowski, "Secreta" Stud, Oxley
R. Astbury, "Rangvilla," Pechey
L. Pick, Mulgildie
D. G. Grayson, Killarney
A. French, "Wilson Park," Pittsworth
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B. J. Jensen "Bremerside" Stud, Rosevale, *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud Pittsworth
W. Zahn, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
G. J. Hutton, "Grajae" Stud, Cabalah
H. L. Larsen, "Oakway," Kingaroy
C. W. A. Palmer, "Remlap," Greenmount

G. I. Skyring, "Bellwood" Stud, *via* Pomona
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
B. F. Jensen, Rosevale
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious
A. Kanowski, "Exton," Pechey
L. C. and E. Wieland, Lower Cressbrook

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
E. C. Phillips, "Sunny View," M.S. 90, Kingaroy
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe

A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M. S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Collier, Tallegalla, *via* Rosewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
L. C. and E. Wieland, Lower Cressbrook

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
R. A. Collings, "Rutholme" Stud, Waterford

M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale Stud," 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville

Tuberculosis-Free Cattle Herds.

The studs listed below have fulfilled the conditions of the Department's Tuberculosis-free Herd Scheme to 31st May, 1957.

Breed.	Owner's Name and Address.
A.I.S.	M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy F. B. Sullivan, "Fermanagh," Pittsworth D. Sullivan, "Bantry" Stud, Rossvale, <i>via</i> Pittsworth W. Henschell, "Yarranvale," Yarranlea Con. O'Sullivan, "Navillus" Stud, Greenmount H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest J. Phillips and Sons, "Sunny View," Benair, <i>via</i> Kingaroy Sullivan Bros., "Valera" Stud, Pittsworth Reushle Bros., "Reubydale" Stud, Ravensbourne H. F. Marquardt, "Chelmer" Stud, Wondai A. C. and C. R. Marquardt, "Cedar Valley," Wondai A. H. Sokoll, "Sunny Crest," Stud, Wondai W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt G. Sperling, "Kooravale" Stud, Kooralgin, <i>via</i> Cooyar C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman W. H. Thompson, "Alfa Vale," Nanango S. R. Moore, Sunnyside, West Wooroolin H.M. State Farm, Numinbah D. G. Neale, "Grovely," Greenmount Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, <i>via</i> Boonah W. D. Davis, "Wamba," Stud, Chinchilla Queensland Agricultural High School and College, Lawes C. K. Roche, Freestone, Warwick Mrs. K. Henry, Greenmount D. B. Green, "Deloraine" Stud, Durong, Proston E. Evans, Wootha, Maleny T. L. and L. M. J. Cox, "Seafeld Farm," Wallumbilla J. Crooke, "Arola" A.I.S. Stud, Fairview, Allora M. F. Power, "Barfield" Kapaldo A. H. Webster, "Millievale," Derrymore W. H. Sanderson, "Sunlit Farm," Mulgildie R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, <i>via</i> Murgon E. R. Radel & Sons, "Happy Valley," Coalstoun Lakes L. Holmes, "Benbecula," Yarranlea Ayrshire J. N. Scott, "Auchen Eden," Camp Mountain E. Mathie and Son, "Ainslie," Ayrshire Stud, Maleny C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie T. F. Dunn, Alanbank, Gleneagle Friesian C. H. Naumann, "Yarrabine" Stud, Yarraman D. J. Pender, "Camelot," Lytton road, Lindum S. E. G. Macdonald, "Freshfields," Marburg Guernsey C. D. Holmes, "Springview," Yarraman A. B. Fletcher, Cossart Vale, Boonah W. H. Doss, Degilbo, <i>via</i> Biggenden A. C. Swendsen, Coolabunia, Box 26, Kingaroy C. Scott, "Coralgrae," Din Din Road, Nanango R. J. Wissemann, "Robnea," Headington Hill, Clifton G. L. Johnson, "Old Cannindah," Monto A. Ruge & Sons, Woowoonga, <i>via</i> Biggenden G. Miller, Armagh Guernsey Stud, Armagh, M. S. 428 Grantham N. H. Sanderson, "Eden Valley," Monto Jersey Queensland Agricultural High School and College, Lawes J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount J. F. Lau, "Rosallen" Jersey Stud, Goombungee G. Harley, Hopewell, M.S. 189, Kingaroy Toowoomba Mental Hospital, Willowburn Farm Home for Boys, Westbrook P. J. L. Bygrave, "The Craigan Farm," Aspley R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy P. H. F. Gregory, "Carlton," Rosevale, <i>via</i> Rosewood E. A. Matthews, "Yarradale," Yarraman A. L. Semgreen, "Tecoma," Coolabunia L. E. Meier, "Ardath" Stud, Boonah A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango F. W. Verrall, "Coleburn," Walloon C. Beckingham, Trouts road, Everton Park W. E. O. Meir and Son, "Kingsford" Stud, Alberton, <i>via</i> Yatala G. H. Ralph, "Ryecombe," Ravensbourne Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy W. and C. E. Tudor, "Boree" Jersey Stud, M.S. 498, Gayndah Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman D. R. Hutton, "Bellgarth," Cunningham, <i>via</i> Warwick J. W. Carpenter, Flagstone Creek, Helidon H. G. Johnson, "Windsor" Jersey Stud, Beaudesert W. S. Kirby, Tinana, Maryborough S. A. Cramb, Bridge St., Wilsonton, <i>via</i> Toowoomba G. & V. Beattie, "Beauvern," Antigua, Maryborough J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah T. Nock, Dallarnil P. Fowler & Sons, "Northlea," Coalstoun Lakes F. Porter, Conondale H. M. State Farm, Palen Creek Polled Hereford B. T. Seymour, "Upwell" Jersey Stud, Mulgildie W. Maller, "Boreview," Pickanjinnee J. H. Anderson, "Inverary," Yandilla D. R. and M. E. Hutton, "Bellgarth," Cunningham, <i>via</i> Warwick E. W. G. McCamley, Eulogie Park, Dululu Wilson and McDouall, Calliope Station, Calliope

Whither the Weather?

By C. W. WINDERS, Officer-in-Charge, Information Services.

Perhaps no-one appreciates more than the meteorologist Hamlet's remark—"There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy."

No-one is more concerned than the farmer that science should solve the riddle of the weather, which lies between heaven and earth and is conditioned by both.

The International Geophysical Year which begins on July 1 provides the opportunity for a concerted study of the mass movements of the atmosphere. This study is certain to yield much information of value in weather forecasting.

The benefits that may be expected from studies in meteorological physics are becoming more evident each year. The mechanism of frost formation has already been revealed and ameliorative measures devised. Recent substantiated successes in rain-making in Australia are further evidence of the fruits of scientific research.

Perhaps hail prevention will in due course be pursued on soundly based lines plotted by the physicist.

But science cannot be expected to render the elements of the atmosphere completely tractable to man. There will always be a need for precision in weather forecasting, more particularly long-range predictions.

The initial difficulty here is lack of knowledge of what determines climatic and weather patterns and changes in these patterns. Is it the interplay of atmosphere, ocean and polar ice? Or is the sun the main agent?

It is probable that really precise long-range forecasting must await answers to these and other questions

from the meteorological physicist. Even then the goal may be a long way off. The mathematician working on rather meagre records of the past, supported only by equally meagre astronomical observations, appears to have little chance of forecasting reliably on the basis of periodicity of weather.

A complicating factor has recently been revealed by the C.S.I.R.O. Division of Meteorological Physics—changes in the climate of Australia have been taking place in recent years.

Perhaps the most constant feature of the Australian climate is a movement of high-pressure systems across the continent from west to east. This movement determines the rainfall and temperature experienced in southern Australia particularly.

Research has shown that the track of the high-pressure systems across the continent has gradually worked towards the south during the past 50 years. Coincident with this displacement there has been a marked increase in summer rainfall in the south and a corresponding decrease in winter rainfall. Further, the annual daily maximum temperature in summer has fallen by as much as four degrees.

Probably all of us have at times pondered the long-term climatic changes that geological evidence shows to be inevitable. But the return of an Ice Age in countless thousands or even millions of years has never caused us any concern.

If there is indeed a relatively short-term climatic change of sufficient magnitude to affect Australian agriculture within a lifetime, then it is

time we put on our thinking caps and examined the position a little more closely.

Unfortunately, meteorologists are as yet no better equipped to forecast climatic trends than they are to forecast weather fluctuations month by month.

So, while some may claim that fruit-fly outbreaks in the southern States are attributable to a change in climate and that recurrent harmful

summer rains are another manifestation of that change, until an uninterrupted trend is demonstrable, we can do little more than speculate on the long-term implications of such a change.

This is disappointing. We can only hope that the International Geophysical Year will usher in an era of rapid progress in our understanding of the fundamentals of climate and weather.

OVER 200 ATTEND TOBACCO GRADING SCHOOLS.

Over 200 southern Queensland tobacco growers and graders attended tobacco grading schools at Inglewood and Yelarbon in April, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently. The schools were arranged by the Department with the co-operation of manufacturers and growers' organisations.

In this area, which produces 30 per cent. of the State's tobacco crop, the schools are intended to help growers market their leaf in the most attractive condition possible.

The Inglewood school was held at the Inglewood Tobacco Experiment Station, Whetstone, and the other in the Yelarbon hall. The Department's Senior Agronomist (Mr. V. J. Wagner) presided at both schools.

Tobacco manufacturers were represented by Mr. H. Chaffey (Field Superintendent of the British-Australasian Tobacco Company), who explained the details of grading based on the position of the leaf of the plant. Manufacturers prefer plant position grading not only because it assists factory routine, but also because plant position usually defines leaf quality.

Instead of having to handle 25 or more grades, the maximum number should be in the vicinity of 10, and the usual number is about five. The reduction in the number of grades as the result of plant position grading allows a considerable saving time and labour.

It helps the grower in other ways, too. For instance, bales containing mixed grades do not sell well because of the uncertainty of the amount of each grade that may be present.

Mr. Collins said the grading methods explained at the schools will greatly simplify grading on the farm. Since similar schools were held in the Inglewood-Yelarbon district in 1955, a large and increasing number of growers and graders are now familiar with the types of leaf the trade requires. Application of this knowledge will undoubtedly improve the appearance and market presentation of leaf produced in this district.

Pasture Improvement on the Mary Valley Alluvial and Coastal Hillside Soils

By G. J. CASSIDY, Adviser in Agriculture.

There are many approaches to pasture improvement in coastal dairying areas. Those which can be followed on *paspalum/kikuyu* country on the Near North Coast are described in this article.

The country along the Mary Valley and immediately south of Gympie is one of the most closely settled dairying districts in the State.

On the undulating "scrub" farms around the centres of Gympie, Kin Kin, Pomona, Cooran, Cooroy, Eumundi, Kureelipa, Mapleton and Maleny the tradition has always been one of grass farming in its simplest form. This means that milking stock roamed properties practically at will and obtained all their sustenance from grass planted after scrub burns by the original settlers upwards of 50 years ago.

Such a system of farming, while an economic necessity to our fathers and grandfathers, has brought about a legacy of problems which become more apparent every season. They are very obvious to the present owners, whose cream production may have declined by as much as 50 per cent. over a period of 10 years.

Reasons for this decline are not hard to find. Advancing bracken fern and blady grass, often the result of regular burning, engulf more of the pastures every year. The invasion of formerly vigorous *paspalum* by mat grass is further evidence of a steady decline in the fertility of pasture soils.

The only weapons on hand to arrest this decline are the existing methods of pasture improvement. These consist of topdressing, better management and the use of the available range of pasture legumes. There is little room left for doubt that such methods can be employed on most of the land in question. For the estimated 5,000 acres of established pasture in the district, a basic system of pasture improvement has now attained the level of tested and established local practice.

SOIL MOISTURE LIMITATIONS.

Periodic droughts and dry springs are a major limitation to pasture improvement, but not so serious as to prevent the overall profitable use of improved pasture.

Valuable introduced grasses such as *paspalum* and *kikuyu* are well adapted to much of this district, while Rhodes grass, green panic and molasses grass may also play an important part. The main deficiency is in pasture legumes suited to the general rainfall pattern of south-eastern Queensland. (See Plate 1 and Table 1.)

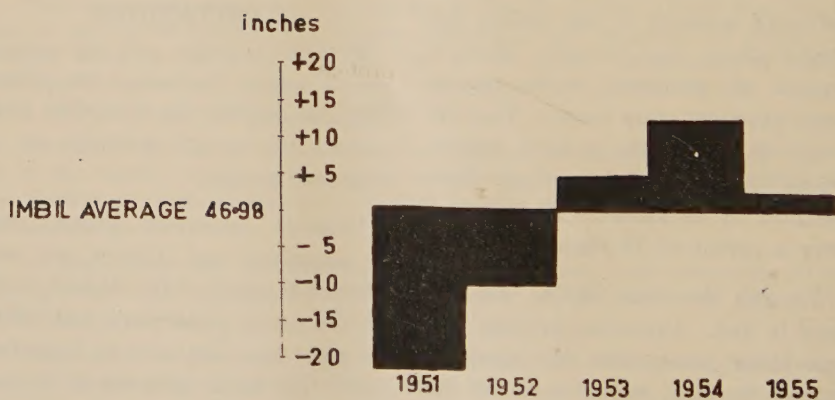
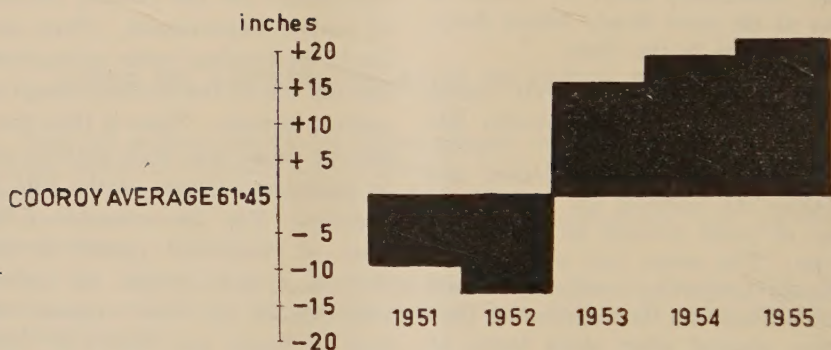
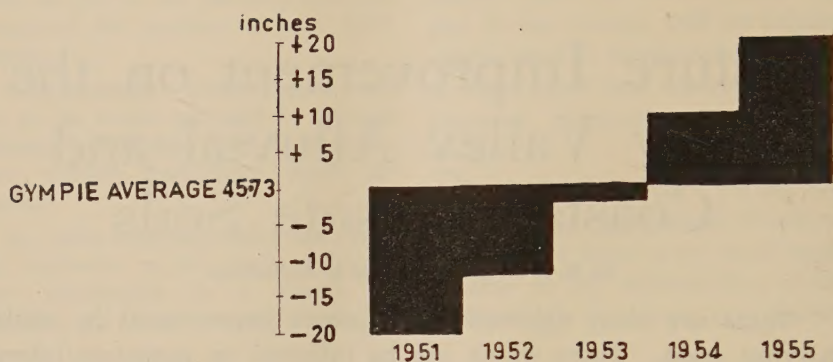


Plate 1.

Diagrams Showing Rainfall Comparisons for Three Mary Valley Centres During the Years 1951-1955. The blocks show the amount above or below the average for each centre during each year.

TABLE 1.

MONTHLY RAINFALL TOTALS FOR GYMPIE OVER A 5-YEAR PERIOD (1951-55),
COMPARED WITH AVERAGE RAINFALL FOR THAT DISTRICT.

Month.	1951.	1952.	1953.	1954.	1955.	Gympie Average.
	In.	In.	In.	In.	In.	In.
January ..	11.85	2.12	4.72	4.69	6.09	6.54
February ..	1.68	1.75	11.19	14.73	6.47	6.79
March ..	3.30	5.90	7.77	3.94	21.24	6.19
April ..	0.89	3.38	4.50	2.12	6.42	3.45
May ..	1.42	6.25	0.63	1.78	8.15	2.76
June ..	0.64	1.95	0.12	1.12	1.24	2.66
July ..	0.11	1.17	0.04	8.82	1.69	2.09
August ..	0.73	1.28	3.06	3.65	0.15	1.70
September ..	0.44	1.45	0.18	2.26	1.57	2.10
October ..	2.97	2.81	2.92	3.06	2.80	2.73
November ..	0.41	1.50	4.98	5.47	2.96	3.29
December ..	0.84	2.80	3.01	3.55	6.58	5.43
Year ..	25.28	32.36	43.12	55.19	65.36	45.73

Up till the present the principal pasture legumes available for use have been winter-growing types such as white clover and red clover. The main factor limiting their universal use under rain-grown conditions has been the unreliability of the winter-spring rainfall.

Not every spring is so dry, however, as to prevent the profitable use of clovers in this area. For instance, 1953, 1954 and 1955 were all good pasture years. Good spring rains in these three years resulted in substantial economic gains for those farmers who have undertaken pasture improvement practices based on the use of winter legumes.

The periods of seasonal drought referred to above may be even more important on steep hillsides or on some of the very light sandy soils. On such soil types the natural rainfall may seldom be sufficient for the successful use of winter legumes. Investigations are now being carried out on these soils, using such summer-growing legumes as *Centrosema*, *Desmodium* and *Stylosanthes* as a means of pasture improvement. The early results of this work are quite promising.

USE OF IRRIGATION.

Irrigation is thoroughly recommended wherever sufficient water is available for use on improved pasture. There is no more profitable way to use an irrigation plant in the business of growing feed for milking stock.

On one district farm a 5-acre area of strip-grazed irrigated pasture has provided 30 cows with $1\frac{1}{2}$ -2 hours of grazing a day for a full 12 months, except for four weeks when extremely wet field conditions prevented grazing. No other crop will put up this performance. This amount of quality protein feed, provided the stock also have access to good quality roughage, is sufficient to keep a milking herd at a high level of production without concentrate feeding.

The choice of the best method of irrigation, whether it be flood, contour ditch or spray irrigation, will depend on a number of factors. The topography of the land, the soil type and the availability of water will need to be considered when deciding to irrigate improved pastures.

A word of warning about spray irrigation. During the consistently dry hot weather which sometimes



Plate 2.

Typical Unimproved Mary River Country, Showing Blady Grass Infestation.



Plate 3.

Milkers Strip-grazing Improved Pasture, Kybong.

occurs in our spring, pastures need a 2-in. application of water every 10-14 days for continuous and rapid growth. To irrigate comfortably even five acres at this rate a farmer needs an irrigation plant and water supply capable of delivering at least 5,000 gallons per hour.

A widespread misapprehension exists concerning this point. *Attempts to irrigate with inadequate plant and insufficient water can be both ineffective and costly.*

SOIL TYPES.

By careful adherence to recommendations and the right fertilizer treatment, improved pastures can be established on almost any district soil of reasonable texture. The exceptions are some very fine-textured red and grey soils, waterlogged soils, and the true wallum country. Investigations

of the problems of pasture establishment on some of these poorer soils are at present being carried out.

On the average district hillside "scrub" farm, the real limiting factors are not connected with soil fertility so much as with available soil moisture and the system of management briefly described at the beginning of this article.

RENOVATION.

One of the biggest factors in the rapid expansion of pasture improvement during recent years has been the development of mechanisation. Light 3-point linkage tractors and their associated implements are the keystone of many a successful programme.

Land preparation is necessary for the establishment of clovers. It is better if this preparation is thorough. The most thorough method, of course,



Plate 4.

Growth of Ladino White Clover, Second Season, Lagoon Pocket.

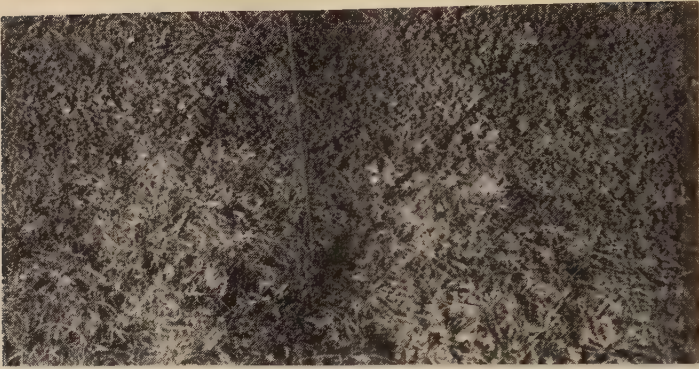


Plate 5.

Effective Strip-grazing, Showing Utilization of Pasture.

is by ploughing and working up in the conventional manner, but there are many sound reasons why this is not always practical:—

(a) Much of the country is sloping hillside land.

(b) Rapidity of preparation is often desirable, the object being to plant early in the autumn, as soon as possible after the main wet season.



Plate 6.

Paspalum-Mat Grass Sward Renovated with Tandem Discs. This kind of treatment is ideal. It stimulates paspalum, represses mat grass, and gives an ideal seedbed for broadcast clover.

- (c) Per-acre costs are reduced and time saved by shallow working of a larger area.

The renovation should nevertheless be severe enough to break up the existing sward as completely as possible (Plate 6). This provides the necessary environment for rapid early development of the young clover plants. Severe treatment of a paspalum and mat grass paddock sets the mat grass back for a full season, at the same time stimulating the growth of the paspalum.

Suitable implements are tandem discs and tillers. Three workings with either type of implement will usually result in a very satisfactory degree of renovation to a depth of approximately 4 in. A heavy overburden of old grass will resist

penetration. In these circumstances, mowing and burning or simply burning of this material is justified for the sake of convenience.

Chisel ploughs are becoming a popular implement for pasture work. These promise to be invaluable for promoting moisture penetration on hillside land. However, patience and care are necessary in their use on the usual type of paspalum or mat grass sward. Before significant penetration can be achieved it is necessary to break up the sward in the manner described (using either tandem discs or tillers) or by thorough shallow preliminary working with the chisel plough itself.

FERTILIZERS.

Field experiments carried out in the Gympie district over the past five

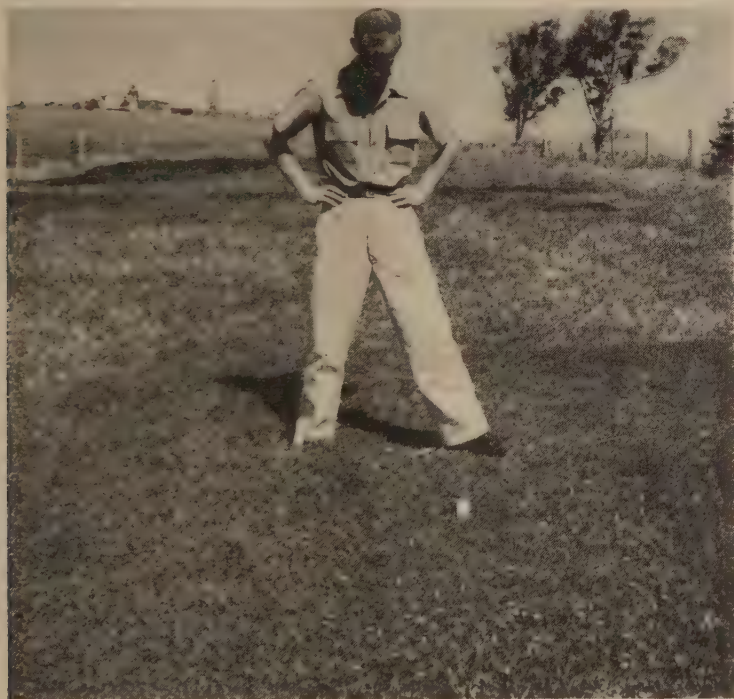


Plate 7.

Phosphate Response by Red and White Clover, East Cooroy. Left, super. 3 cwt. per acre applied in May, 1956. Right, no super. Both areas topdressed with super. at 10 cwt. per acre in April, 1953.



Plate 8.

Sod-seeder with Feet in Ground, Showing Penetration.

years have pointed to phosphate as the major plant food required for clover establishment. Observations at Cooroy, Imbil, Conondale, Kia Ora, Wolvi and Gympie all reveal a marked response to superphosphate. These field responses confirm a general acute phosphate deficiency indicated by hundreds of soil analyses carried out in the district over the same 5-year period.

Much remains to be done to determine the most profitable application rates of superphosphate and to study the availability of this plant food in the soil. However, excellent results can be expected by adhering to the following recommendations:—

- (a) An initial superphosphate dressing at approximately 3 cwt. per acre.
- (b) Regular annual topdressing at 2 cwt. per acre.

On worked-out cultivation land and on fine soils of poor structure a mixture of blood, bone and super. often gives better results than superphosphate alone. It helps growth in the young plants by supplying a small amount of organic nitrogen in addition to the necessary phosphate.

LIME.

All soils referred to in this article are acid soils. Acidity is the result of continuous leaching by intense summer rains and may be corrected by the application of lime in one form or other.

The clovers used, and white clover in particular, will grow quite well in acid soil provided that there is enough *available* phosphate and that effective nodulation with root nodule bacteria can take place. In highly acid soils both these requirements are usually lacking and failures have

resulted. It is necessary in such cases to reduce the acidity of the topsoil by applying agricultural lime, thus bringing about a more congenial environment for the development of the young clover plants.

A good criterion is the absence or natural presence of white clover in untreated pastures. In the event of its total absence it is advisable to apply agricultural lime to at least some of the planting and observe the result.

Recommended rates are half a ton to 1 ton per acre broadcast. If broadcasting lime in the conventional manner, little effect on soil acidity can be expected from rates of less than half a ton per acre.

SOD-SEEDING.

Where pasture is being planted on properly prepared land, the standard

methods of broadcasting or drilling of the seed are used. However, there has long been a need for a machine which could sow legume seed into an existing grass sward without destroying that sward.

Research workers studying problems of legume nodulation in the "big scrub" areas near Lismore in New South Wales devised a sod-seeding machine to enable them to establish clover plants in an old *paspalum* sward.

This machine, which is called a sod-seeder, is a tiller with specially designed renovation boots, the whole surmounted by a seed and fertilizer box. In addition to opening up the sward and planting pasture seeds, this machine allows for the proper placement of fertilizer for use by the new seedlings.

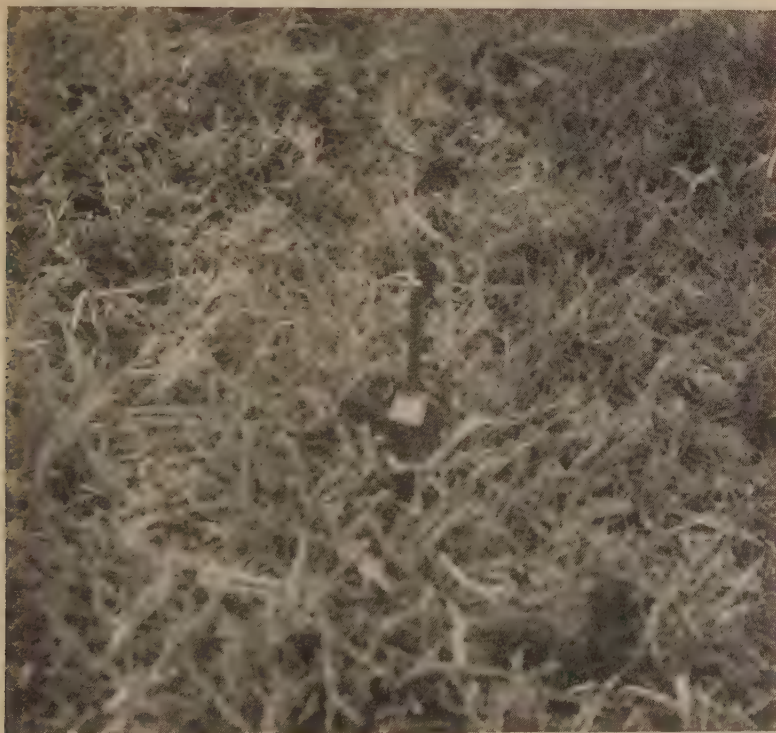


Plate 9.

Drill made by Sod-seeder Boots in a *Paspalum* Sward. Matchbox and pencil indicate the depth of penetration.



Plate 10.

Clover Regeneration in the Third Season, East Cooroy. Note establishment of kikuyu planted by turves in contour furrows.

Fertilizer mixtures comprising superphosphate plus lime or dolomite may be used with this equipment. By using a basic fertilizer mixture of this type, the soil acidity in the immediate vicinity of the inoculated legume seed is reduced. At the same time the availability of the applied phosphate is assured by virtue of the accurate placement. The use of such a machine, by concentrating the fertilizer and lime where it can do most good, avoids the necessity for heavy and expensive overall treatment.

Preliminary experiments with sod-seeding machinery in this district indicate that the fertilizer and seed placement principle is quite successful. The young seedlings, however, are extremely slow to develop in competition with a sod-bound *paspalum* or mat grass sward.

This seems to confirm the need for some degree of renovation treatment prior to sod-seeding.

TRACE ELEMENTS.

Experimental work at nine sites throughout the district has so far revealed no clear-cut trace element deficiency affecting the establishment or growth of pasture. In one area there was some indication of molybdenum deficiency. Otherwise, in all cases, low phosphate and low nitrogen were definitely the limiting factors.

INOCULATION OF SEED.

Recent investigations in both Queensland and New South Wales have shown that it is *imperative* for clovers to be inoculated with the right strain of nitrogen-fixing bacteria. Without it they will not

survive in competition with other pasture species. There is little doubt that many early pasture failures in this district were due to legume nodulation failures.

Inoculation is carried out by treating the seed with the appropriate strain of bacteria before planting. Inoculum for seed treatment is available free of charge from the Department of Agriculture and Stock, at both the Brisbane and the Gympie offices. Under no circumstances should legume inoculation be neglected.

PLANTING MIXTURES.

The following seed mixtures are recommended as the most successful used throughout the district:—

- (1) For oversowing paspalum or mat grass sward following thorough renovation.

	lb. per acre.
Ladino white clover ..	1
N.Z. white clover ..	1
H.1 ryegrass ..	4
Montgomery red clover	2

- (2) For oversowing paspalum or mat grass sward following light renovation.

	lb. per acre.
Ladino white clover ..	1
N.Z. white clover ..	1
Montgomery red clover	2

- (3) For planting on a well-worked seedbed such as old cultivation.

	lb. per acre.
Paspalum ..	4
H.1 ryegrass ..	4
Ladino white clover ..	1
N.Z. white clover ..	1
Montgomery red clover	2



Plate 11.

Non-irrigated Improved Pasture, Cooroy District, Third Year's Regeneration.

This was a former cultivation paddock planted with white clover, red clover and H.1 ryegrass.



Plate 12.

Spray-irrigated Pasture, Kybong, Third Season. It consists of phalaris, H.1 ryegrass, red clover and white clover.

The ultimate fate of all these mixtures, if properly managed, will be a paspalum-white clover sward, which is a valuable pasture.

Red clover and ryegrass are included because of the very significant contribution they can make to the yield of the first and (less frequently) the second year's grazing.

- (4) For irrigated pastures. (This mixture should be sown into a well-worked seedbed, as for lucerne.)

lb. per acre.

Reed canary grass ..	4
H.1 ryegrass ..	4
Ladino white clover ..	1
N.Z. white clover ..	1
Montgomery red clover	1

IMPORTANT POINTS.

The right seed and the right fertilizer are basic essentials in pasture work; but there are a few practical points which need emphasis.

First, the applied fertilizer and lime need to be in close proximity to the planted seed. The critical stage in clover establishment is the seedling stage, when success depends on good nodulation and early growth. The young plants can hardly be expected to thrive if the lime and phosphate have, for example, been well "disced-in" out of reach of the roots. This is more likely to occur on a prepared seedbed than on renovated pasture.

It is, therefore, a good general principle when broadcasting to spread

the lime, fertilizer and inoculated seed in that order—and then cover the whole lot with one light harrowing.

Second, the seed should be covered *lightly*, but covered without delay, because sunlight destroys the legume bacteria on the inoculated seed.

The implement used depends on the state of the ground. For example, a set of tandem discs angled slightly can do a very satisfactory job on a renovated paspalum sward, but on a finely worked seedbed they would bury the seed too deeply. In the latter case a set of diamond harrows turned upside-down will often suffice. A length of heavy chain looped on a spreader bar has also been found very effective.

Finally, fertilizers with a highly acid reaction are toxic to legume bacteria. Therefore, if inoculated seed is mixed with fertilizers before planting the purpose of inoculation may be defeated. Treated seed cannot be mixed with superphosphate, sulphate of ammonia, muriate of potash or sulphate of potash. Neither can it be mixed, of course, with combinations of these chemicals.

It is quite safe to mix inoculated seed with agricultural lime or dolomite, or any neutralised fertilizer containing these materials (for example, basic superphosphate).

As pointed out previously, a basic or neutralised fertilizer is necessary for use with the sod-seeder because the seed and fertilizer are concentrated together in a single narrow drill. If ordinary superphosphate were used under these conditions the nitrogen bacteria would normally be destroyed before they had time to invade the roots of the young clover plants.

Experience and observations indicate that some degree of close and intimate contact between seed and

fertilizer is necessary before nodulation is noticeably affected. Provided they are not mixed together before planting and are broadcast separately, acid fertilizer and inoculated seed can be applied on the same day without any ill effects.

MANAGEMENT.

The management of a pasture after it is established and ready for grazing is just as important as all the other points previously discussed. Pasture improvement is essentially long-term work. In many cases, when treating backward country impressive results are not achieved during the first season.

In non-irrigated pasture work it may take up to three years before the response in the country becomes easily perceptible; and they must be three years of good management. From this stage onward the improvement will continue as long as the good management is maintained.

The following are the cornerstones of profitable pasture management throughout the district.

(1) *Late summer and autumn mowing.*—The rapid and heavy flush of paspalum or mat grass which follows the late summer wet season literally smothers early clover growth. This overburden of grass usually needs to be removed with a mower before vigorous clover growth can begin. It is possible that fodder conservation may fit into this phase of management.

Occasional mowing (following grazing) during the season is also the most effective means of controlling blady grass, bracken fern and other pasture weeds which have a tendency to colonise newly renovated land.

(2) *Regular autumn topdressing with superphosphate to encourage clover growth.*—If weather conditions allow mowing and fertilizing to be carried out in March or April, good

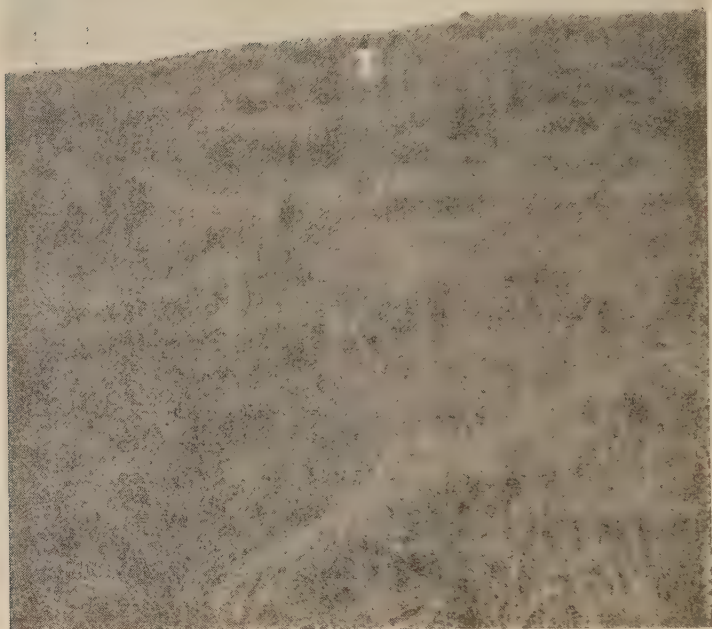


Plate 13.

**Heavy Seasonal Cover of Paspalum Which Prevents Early Clover
Regeneration, Cedar Pocket.**

clover yields are available for high quality grazing early in the spring, just as most herds begin their lactation.

(3) *Regular spreading of manure.*—This should be done several times during the season and before the pats of dung become hard, dry and useless. It can be carried out using pasture harrows or, if the ground surface is even, a simple manure spreader constructed of weatherboards (such as is sometimes used for seedbed levelling). These can be up to 10 ft. wide. The weatherboards, dragged along face down, have a smearing and spreading action on the pats of manure. The old concept of one night paddock should be abandoned and several smaller paddocks used in rotation.

Such a system in conjunction with regular harrowing will pay handsome dividends in improved soil fertility.

(4) *Rotational grazing.*—This, of course, depends on adequate subdivision—as do all the other operations mentioned. Little benefit can be derived from any of them without the exclusion of stock when necessary. A good paddock size to aim for ultimately is five acres for the average herd of 40-50 milkers. Very productive areas (for example, irrigated pastures) can then be further subdivided for intensive feeding by using an electric fencer. When making a start, the number of paddocks treated and their size depends, of course, on existing fence arrangements and general convenience.

TABLE 2.
COMPARISON OF PASTURE AND CROP COSTS.

System.	Autumn Season.	Spring Season.	Total Cost of Establishment.
Permanent pasture	£ s. d. Pasture seeds 2 7 0 2 bags super. 2 10 0 10 cwt. lime 3 5 0 Land preparation .. 6 3 6	..	£14 5 6 per acre
Seasonal cropping (Rotation A)	Oat seed .. 1 9 3 1 bag N/P fertilizer 2 5 0 Land preparation .. 6 3 6	£ s. d. Poona cowpea seed .. 2 0 9 1 bag N/P fertilizer 2 5 0 Land preparation .. 6 3 6	£20 7 0 per acre
Seasonal cropping (Rotation B)	Oat and field pea seed .. 2 3 6 1 bag N/P fertilizer 2 5 0 Land preparation .. 6 3 6	Sweet Sudan seed .. 2 0 0 1 bag N/P fertilizer 2 5 0 Land preparation .. 6 3 6	£21 0 6 per acre

COSTS.

The cost of pasture establishment is not excessive. It is interesting to examine the relative costs of pasture establishment and annual cropping. In Table 2 the figures are based on 1956 prices for seed, fertilizer and contract ground preparation.

While the cost of seasonal cropping is an annually recurring cost, that for pasture establishment is incurred only in the establishment year.

There is, of course, an annual cost involved in maintaining the pasture (for example, for annual topdressing, mowing, manure spreading, etc., plus occasional renovation). However, this annually recurring cost would be only about 20 per cent. of the

establishment cost and a still smaller fraction of the annual cost of seasonal cropping.

Permanent pasture is thus cheaper to establish and maintain than annual crops. Accurate figures are not yet available to assess the relative values of *production* of improved pasture and annual fodder crops. It is not therefore possible (or desirable at this stage) to claim that the one is more profitable than the other.

On all properties on which there is suitable soil which can be safely cultivated there is room for both pasture and seasonal fodder crops. Neither the one nor the other can provide uniform year-round production. Used together, and with the assistance of fodder conservation, they can go a long way towards evening out production.

GEOLOGICAL MAPS NOW AVAILABLE.

Landholders in certain south-eastern areas who are interested in the geological formations underlying their properties will find the answer in geological outline maps just released by the University of Queensland.

These maps have been prepared to fit the 1 inch to 1 mile military maps for the Glasshouse, Samford and Ipswich areas. The geological outline map for the Cressbrook 1 mile sheet will appear shortly.

The military map is placed on top of the outline map over or in front of a suitable light and the geological boundaries traced in on the military map.

The military maps may be bought from Watson, Ferguson & Company, Stanley Street, South Brisbane for 2s. 2d. each, and the outline maps from the University Bookstore (George street, Brisbane, or St. Lucia, Brisbane) for 2s. each.

TOBACCO GROWERS !

Sending cash with orders for tobacco seed will ensure immediate despatch.

Ordering seed C.O.D. may involve considerable delay.

Indicate a second preference in case the desired variety is unavailable.

Seed is sold to Queensland tobacco growers at the rate of 6s. per ounce.

Reasonable stocks of the following varieties are on hand:—

Hicks	Virginia Brightleaf
Virginia Gold	Mammoth Gold
Gold Dollar	402

Pineapples Need Plenty of Potassium

By R. C. CANNON, Senior Horticulturist.

Most of the soils in coastal Queensland are deficient in potassium and liberal amounts must be included in the fertilizer to ensure maximum production of good quality fruit in the pineapple crop.

Plants which are well supplied with this nutrient have long and broad leaves, and are generally larger and of a darker green than those which are under-supplied. If the soil is deficient in this element, the shortage must be made good by fertilizers which provide the amount the crop is likely to need. Large quantities can be used, since potassium is not readily leached from the soil. Any excess above the immediate needs of the crop simply builds up the available reserves in the soil; very little is wasted.

Potassium and Plant Growth.

Large amounts of potassium are needed in those parts of the plant where active growth is taking place. Any surplus within the plant is

stored in the butt and the older leaves, from which it is withdrawn as required. When a deficiency occurs, it first shows up in the older leaves; small brown discolorations develop in the green tissues and the leaves commence to die back from the tips.

There is a fairly close relation between the intake of potassium and the intake of nitrogen. If there is a shortage of potassium, pineapples cannot make full use of the available nitrogen. The absence of dark-green colour in the leaves, which is a typical symptom of a deficiency in nitrogen, is therefore sometimes due to lack of potassium.



Plate 1.

Fruiting Pineapples. If your crop is not up to this standard, more potassium may be needed in the fertilizer programme.

Potassium is needed for the formation of carbohydrates (starches and sugars) within the tissues. These, in turn, determine the rate of plant growth and the size and quality of the fruit. On many soils, increasing the amount of potassium in the fertilizer increases the acid content of the fruit juice and brings out its full flavour. The high sugar content of the fruit which is characteristic of plants which are well supplied with potassium offsets the tartness of the flesh and makes it more palatable. Tasteless insipid pineapples are almost always low in acid.

Sandy Soils are Low in Potash.

As a general guide, it may be assumed that the potassium content of a soil is related to its texture. The heavier the soil, the higher its potassium content is likely to be. For instance, the clay loams of the Mary Valley and Yeppoon are fairly well supplied with potassium, whereas the sandy soils near the coast are low in this element.

Alluvial soils are, for the most part, fairly rich in potassium. The rather coarse granitic alluvials of the Herbert River, because of the nature of the parent rock, are well supplied, while the Burdekin Delta alluvials are usually rich in potassium. On soils of the latter type, high yields of pineapples may be obtained without potassium in the fertilizer; sulphate of ammonia alone is adequate for normal production.

The amount of potassium required in the fertilizer depends on the reserves of this element in the soil. Most of the coastal soils in southern Queensland are sands or sandy loams which range in colour from grey to red. They are frequently deficient in potassium and pineapples grown on them respond to additional potassium in the fertilizer.

On these light-textured soils, the pineapple crop requires about double the amount of potassium supplied by the standard fertilizer schedule in which a 10:6:10 mixture and sulphate of ammonia are applied alternately. This requirement could be met by using a different mixture or applying twice the quantity of 10:6:10.

Perhaps the better practice in southern Queensland is to use the 10:6:10 mixture at the rate of 50 lb. per 1,000 plants every time fertilizer is applied to the crop. This doubles the amount of potassium without any considerable change in the total amount of nitrogen supplied.

Fertilizing the Plant Crop.

In the case of autumn-planted tops, 30 lb. of the 10:6:10 mixture per 1,000 plants is sufficient for the first application after planting. This is made in April, a few weeks after planting has been completed and as soon as the young plants have thrown out a few roots. From then on, six applications of the same mixture at a rate of 50 lb. per 1,000 plants will be needed before the plant crop is harvested.

Weather conditions influence the time of application slightly, but the fertilizer should be applied, where possible, in September, December, and again in February, April, September and November of the following year.

With spring plantings of slips or suckers, the first fertilizer application is made a few weeks after planting, using the full 50 lb. per 1,000 plants.

Trace element deficiencies are more acute in some areas than in others. Sandy soils are usually fairly low in copper and zinc, deficiencies of which are responsible for the disorder in pineapples known as crookneck.



Plate 2.

Autumn-Planted Pineapple Tops on a Light Sandy Loam. Soils of this type are usually deficient in potassium.



Plate 3.

Pineapple Fertilizer Trial, Glasshouse Mountains. Trials such as this supply data which give precision to fertilizer recommendations.

The first fertilizer applied after planting should therefore be a 10:6:10 special mixture containing copper (as copper sulphate) and zinc (as zinc sulphate).

Fertilizing the Ratoon Crop.

The behaviour of the ratoon crop depends largely on the rate at which suckers from the plant crop grow. In their early stages of development, these suckers need a generous supply of nitrogen. This can be met by applying 50 lb. of sulphate of ammonia per 1,000 plants as soon as the plant crop has been harvested. As the summer plant crop is normally picked during the February-March period, it should be possible to apply this treatment before the end of March—the sooner the better.

Following this application of sulphate of ammonia, the usual 10:6:10 mixture is required in the following April, September, December and February. This fertilizer schedule will supply sufficient potassium and nitrogen to enable pineapples to make good growth for

an autumn intermediate harvest, provided the crop has been planted at the right time and receives proper attention during the growing period.

Does It Pay?

With the foregoing fertilizer programme, there should normally be no trouble in getting a good summer plant crop, followed by a ratoon crop 15 months later in the May-June period. Under really favourable conditions, it may even be possible to produce a summer ratoon crop 12 months after the plant crop, which would be all to the good. Maximum production per acre is therefore obtained.

It costs more to fertilize with 10:6:10 throughout the cropping cycle, but the increased production per acre should more than offset this. The value of extra potassium in the fertilizer programme has been proved in field experiments. Growers who have used it are convinced that the additional expenditure is well worth while.

WINTER WORK IN THE APIARY.

Winter is the most suitable time for beekeepers to carry out maintenance work in their apiaries.

Mr. C. Roff, Adviser in Apiculture, Department of Agriculture and Stock, recommends a general clean up of the honey house or extracting van at this time of the year. All extractor parts, the interior of the honey tanks, honey pumps, uncapping knives, reducers and other utensils that come in contact with honey should be thoroughly washed and dried. They should then be given a protective smear of petroleum jelly, smoothed off with a cloth.

Spare supers and frames can be scraped clean, and the frames re-wired and fitted with foundation. This work should be done in a warm room. Supers, floorboards and covers can be repaired and painted.

If it is planned to increase the apiary or to stock an out-apiary, additional covers and bottomboards will be necessary. If hivebodies and frame, which most beekeepers can make, are needed, it is better to buy machine-made equipment as this is usually more accurate in design. All equipment should be assembled during winter in readiness for the commencement of work in spring.

It is advisable to examine all stored comb for wax moth damage. If the combs have not been treated, they should immediately be fumigated with paradichlorobenzene (PDB).

Progress in Banana Leaf Spot Control in North Queensland

By W. PONT, Pathologist, Science Branch.

Improvements in methods of controlling *Cercospora* leaf spot of bananas developed in recent years have provided a more efficient and economical means of reducing the losses due to this disease.

The technique of applying oil-based fungicides to bananas promises to make leaf spot control commercially practicable on plantations where spraying has been considered uneconomic in the past.

The experimental approach to the problem of control, and the results obtained to date, are described in this article.

For some years past the search for an economical control for *Cercospora* leaf spot of bananas has been going on in North Queensland. Some success has followed these efforts and has aroused the interest of southern growers. It is to provide information for these interested persons that the following notes have been written.

North Queensland was chosen as the location of the experiments because leaf spot has been a limiting factor in the production of bananas in this region of the State since the 1920's, when the fungus *Cercospora musae* was first recorded in Queensland. The tropical climate of the North guarantees weather conditions which are practically ideal for the development of the disease throughout the greater part of the year.

It was appreciated that any control measures which were developed as a result of the work in North Queensland would be at the very least equally effective in the south of the State, where, as a rule, conditions during the winter and spring exert a braking effect on the development of the disease and the fungus causing

the disease is not active for the same length of time.

The experimental work will be discussed under two headings:—

(1) High pressure, high volume spraying with the active ingredients in suspension in water.

(2) Low volume misting and fogging with the active ingredients in suspension in mineral oils.

A fundamental difference between these two methods of treatment, apart from the fact that one uses water-based materials and the other oil-based materials, is to be found in the particle sizes of the emitted products. High pressure spraying is characterized by a much coarser average particle size than is either misting or fogging.

HIGH PRESSURE, HIGH VOLUME SPRAYING.

This work was carried out with a small spray plant consisting of a twin cylinder pump powered by a 98 c.c. 4-cycle engine. Working pressures of up to 250 lb. per square inch were used. Delivery was by high pressure

spray hosing through an adjustable swirling type nozzle. Output per acre varied considerably according to planting distance, but an average dosage for a well-grown plant would be half a gallon. Under normal working conditions the pump was transported through the plantation on a truck.

Protectant Fungicides.

Field experimental work commenced in July 1951, and the value of heart-leaf spraying as a means of leaf spot control was tested in a series of trials which terminated at the end of 1955. In these experiments copper oxychloride was compared with copper oxychloride plus wettable sulphur; copper oxychloride, Bordeaux mixture (3-2-40), and home-made cuprous oxide were compared with the new organic fungicides thiram, ziram and zineb; and long spray schedules were compared with short spray schedules. A schedule involving cover spraying commencing late and carried through until the bunch was harvested was also investigated.

The information gained from this phase of the work can be summarised as follows:—

(1) Copper oxychloride and copper oxychloride plus wettable sulphur were equally efficient.

(2) The copper fungicides as a group were superior to the organic fungicides and in these trials copper oxychloride and Bordeaux (3-2-40) were more efficient than home-made cuprous oxide.

(3) The effects of leaf spot spraying are cumulative. The process of getting leaf spot under control in a badly infected plantation is a gradual one, but whilst the mother plants are being sprayed the suckers are also being protected and the benefits of treatment, therefore, are much more apparent in the ratoons.

(4) To bring leaf spot under control plantations should be heart-leaf sprayed regularly with periods of not longer than four weeks between applications, treatment terminating as the plants bunch. It is particularly important that this schedule be adhered to during the late summer and autumn months when leaf spot infection is at a maximum due to increased activity of the fungus and to rapid growth of the plants.

(5) Late cover spraying with the same interval between treatments has proved to be of benefit. However, this method of treatment should be substituted for heart-leaf spraying only when the attempt to bring leaf spot under control has been left until late in the life of the crop.

Suppressive Fungicides.

The fungicidal sprays used in the above work were protectants only—that is, they reduced infection by killing the fungus before it became established within the leaf.

The youngest leaf on a plant is infected progressively as it unfolds by spores from various sources; these spores germinate and the fungus penetrates into the leaf. When conditions are favourable this process may not take more than one week. During the summer and autumn the banana plant grows at an average rate of a little over one leaf per week. It can be seen, therefore, that spraying at intervals of four weeks can give complete protection to only a limited amount of foliage and it is also evident that increased control can only be achieved at greater expense, by increasing the frequency of application of the protectant sprays.

Because the most important sources of the spores which infect young foliage are the leaf spots on older leaves, it appeared that, if the spore production on these spots could be reduced as a result of spraying, an

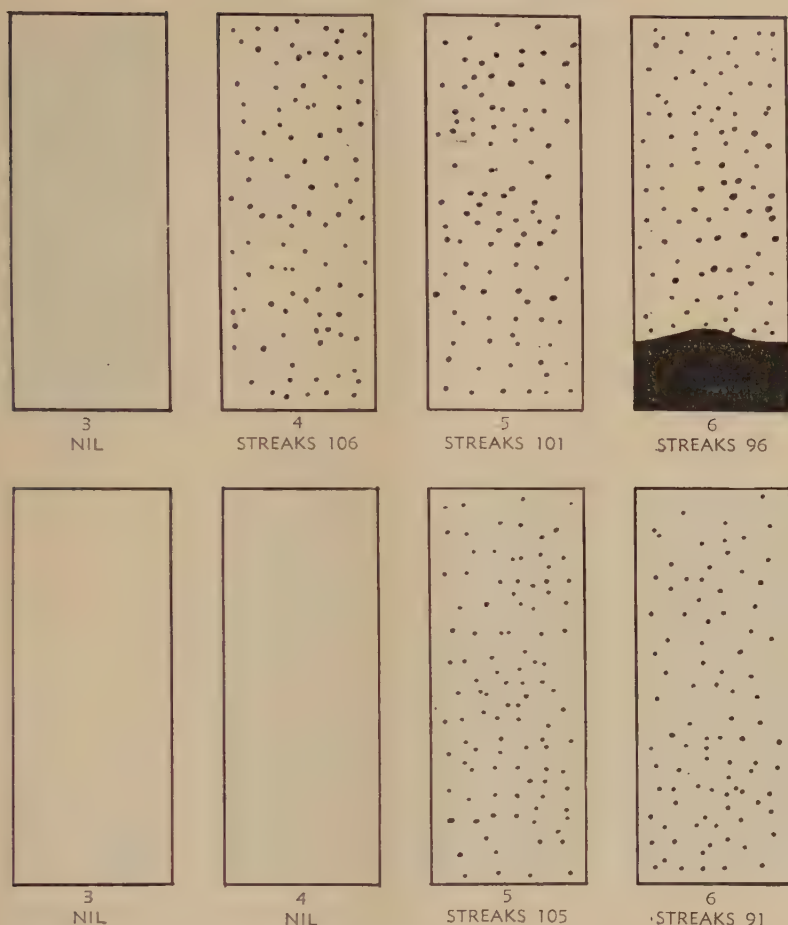


Plate 1.

Bordeaux + White Oil + Malachite Green Spray. Numbers of streaks and spots on 28/6/56 on unsprayed leaves (above) and sprayed leaves (below).

improvement in leaf spot control would result. It was also thought that the efficiency of the spray mixture might be improved if a sticker were used instead of the detergents and soaps which had been used previously as wetting agents.

After some preliminary testing it was decided to include the green fungicidal dye malachite green and the emulsifiable mineral oil commonly known as white oil in a mixture to be tried in the field. A trial was, therefore, initiated at the beginning of 1956 in which Bordeaux mixture

(3-2-40) plus white oil (1-160) plus malachite green (1:10,000) was compared with the following:—

Bordeaux (3-2-40) plus a proprietary wetting agent.

Bordeaux (3-2-40) plus a proprietary calcium caseinate sticker.

Bordeaux (3-2-40) plus a proprietary wetting agent plus 1 per cent. urea.

Unsprayed check.

During a bad outbreak of leaf spot it was apparent that the Bordeaux plus white oil plus malachite green



Plate 2.

Bordeaux + White Oil + Malachite Green Spray. Numbers of streaks and spots on 16/7/56 on unsprayed leaves (above) and sprayed leaves (below).

mixture was superior not only to the unsprayed check but also to the other Bordeaux mixtures. Table 1 provides a comparison of the efficiency of the various treatments.

When a reason was sought for the increased efficiency of the mixture including white oil and malachite green, it was found that as well as reducing infection in the usual manner by protecting uninfected foliage the spray was exerting an effect on the growth of the fungus within the leaf—that is, it possessed fungistatic

properties. The percentage of early stage infections (streaks) which reached the spot stage was remarkably reduced and the time taken for the transition from the streak stage to the damaging spot stage of the disease was prolonged.

These facts are illustrated in the accompanying figures depicting the changes which took place during June, July and August, 1956, in areas (actual size 6 in. x 2 in.) marked on leaves of the same age on an untreated and treated plant. The marked leaves

were respectively the first, second, third and fourth fully opened leaf when the treated plant was sprayed with Bordeaux (3-2-40) plus white oil

plus malachite green on May 29, 1956. Leaf numbers indicate the number down from the youngest fully opened leaf at the date of spot counting.

TABLE 1.
SUMMARY OF RESULTS.

Treatment.	Average Number of Leaves per Plant at Flowering.	Average Leaf Spot per Plant at Flowering. (Expressed in percentage of spotted leaf surface).
Bordeaux plus white oil plus malachite green ..	13.2	8.9
Bordeaux plus wetter plus 1% urea ..	11.3	15.2
Bordeaux plus wetter	11.2	16.0
Bordeau plus sticker	11.1	13.3
Unsprayed	9.4	16.8

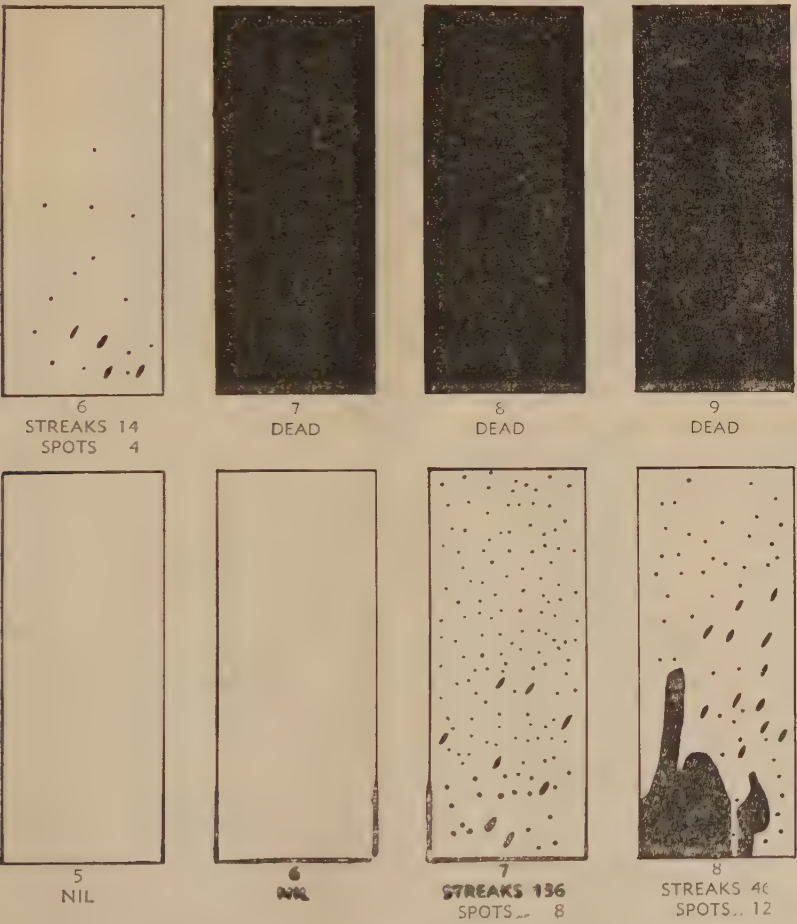


Plate 3.

Bordeaux + White Oil + Malachite Green Spray. Numbers of streaks and spots on 6/8/56 on unsprayed leaves (above) and sprayed leaves (below). The latter plant had bunched.

This mixture has since been recommended for trial to growers in North Queensland who normally practise spraying for leaf spot control. Reports indicate that sprayed plantations in the Tully area withstood extremely well serious outbreaks of *Cercospora* leaf spot. Fruit consigned from these plantations reached Brisbane in remarkably good condition, in contrast to that consigned from unsprayed plantations, in which the percentage of waste due to ripening in transit is very high.

Further experimental work with this spray is in progress. The supplements white oil and malachite green are being tested in another field trial, not only in combinations with Bordeaux but also combined with copper oxychloride and zineb. In another trial the reason for the increased activity of the mixture is being further investigated. It is necessary to know whether this results from the action of white oil or of malachite green or from an interaction between these two materials.

LOW VOLUME MISTING AND FOGGING.

During recent years the problem of applying fungicides and insecticides as air-assisted low volume sprays has received a lot of attention due to the obvious advantages of this method of treatment—for example, the elimination of the necessity to use large amounts of water and the reduction in the time taken to treat a given area. However, low volume application of water-based materials possesses a disadvantage which limits its use somewhat. The water tends to evaporate rapidly from the very small droplets of spray mixture produced by this method.

In 1954 and 1955 research workers in the Antilles (West Indies) published details of experimental work in which a technique for the application of oil-based copper oxychloride and zineb to

bananas for the control of *Cercospora* leaf spot was developed and its efficiency demonstrated. The disadvantage of evaporation of small droplets was thus overcome by the use of an oily suspension.

In brief, the method developed by these French workers and now used in the West Indies involves the application of the fungicide in oil mixture to bananas by the use of knapsack misting machines. The low dosage rate of 2½ gallons of fluid per acre is used. The active ingredient is suspended in dieselene and then the diluent oil (orchard spray oil) is added. A typical formula is—

- 4½ gal. orchard spray oil
- 1 gal. dieselene
- 6½ lb. 50 per cent. copper oxychloride, or
- 2½ lb. 25 per cent. zineb.

An alternative method of applying the oil-based fungicide was also investigated by these workers in their preliminary experiments, namely, nebulisation or fogging. This employs particles whose dimensions are smaller than those which comprise the oily mist. A typical formula is—

- Lubricating oil 2 gal.
- Dieselene 2 gal.
- White oil 3½ pt.
- Copper oxychloride .. 12 lb.

In these trials misting proved to be superior to fogging. An outstanding feature of both methods was the effect which the mineral oils exerted in arresting the development of the fungus within the leaf—that is, after infection has occurred. Later tests showed that some quite good control could be obtained by misting plants with straight orchard spray oil.

The application of oil-based fungicides for leaf spot by either misting or fogging has tremendous possibilities, particularly in areas where water is not readily available or on



Plate 4.

Fog Application of Fungicides for Leaf Spot Control.

inaccessible plantations, such as those on hillside sites. Accordingly, when a Swingfog SN6 machine became available to the Department in June 1956, it was decided to test the new techniques. A small-scale preliminary trial soon demonstrated the suitability of the machine for either misting or fogging and gave promising indications of the efficacy of both methods for leaf spot control.

A large trial was initiated in late December to test the effect of misting and fogging at both weekly and fortnightly intervals. The formulae used were basically the same as those used by the French workers, details of which are given above. In this trial "drift" treatment has not been

practised, due to the fact that the experimental site is exposed to the prevailing winds and wind velocity is often too high to allow the successful use of this technique. Row by row treatment has, therefore, been used, the direction of travel being at right angles to the wind, with the mist or fog discharged in the direction of the wind.

In the case of misting the ground is covered at a slow walking pace; output is less than 2 gallons per acre. Rate of travel is lightly slower when fogging is practised but output is less due to the smaller orifices in the flow control jet and outlet nozzle used for this operation.

The incidence of leaf spot in the experimental block was already at a maximum in February and March because of the unusually early start in December of the wet season rains. It has, therefore, been possible to make a preliminary appraisal of the effects of treatment. Table 2 lists the average of readings which were made on a number of stools approaching the flowering stage in each block at the middle of March. The figures in brackets represent an adjusted average leaf spot figure which takes into account the three additional dead leaves on the untreated plants.

The results indicate that both misting and fogging exert a considerable degree of control of banana leaf spot;

however, the weekly treatments are far more efficient. It is noticeable from the detailed readings on the plants (which it is not possible to publish here) that the oil treatments have had an immediate effect in suppressing leaf spot development on the older leaves of treated plants.

In terms of actual ingredients used per acre, the operation of controlling leaf spot with applications of oil-based copper oxychloride is more expensive than that of spraying for leaf spot control.

For example, in the case of misting the cost is approximately £1 10s. per acre per cycle, or £6 for four weeks when weekly misting is practised.



Plate 5.

Appearance of Bananas Misted at Weekly Intervals. Compare with Plate 6.



Plate 6.

Untreated Plants Adjoining Those Shown in Plate 5.

The materials used in spraying cost less than £4 per acre for one cycle of four weeks. However, the increased cost of materials is more than balanced by the saving in time made when low volume misting with oily suspensions is used.

Without stoppages due to mechanical difficulties it should be possible to mist an acre of bananas in less than one hour, including the time spent in refilling the fungicide and petrol tanks and in cleaning the filter. This means that an acre of

TABLE 2.
RESULTS OF MISTING AND FOGGING.

Treatment.	Average Number of Leaves per Plant.	Average Leaf Spot per Plant.
Misting (weekly)	12.3	10.1
Fogging (weekly)	11.7	14.9
Untreated	8.7	24 (43)
Misting (fortnightly)	10.6	32.9
Fogging (fortnightly)	10.9	29.6
Untreated	7.3	21 (45)

bananas can be treated in this fashion in less than four hours per four weeks. The minimum time needed to spray an acre of bananas would be 7-8 hours. Some growers have more recently introduced modifications of spraying which enable them to cover an acre of bananas in approximately two hours.

This experiment will be carried on for the remainder of this year in order that the effect of the treatments

on growth and production over a period may be noted. Of particular interest will be the leaf spot incidence in and the growth of the ratoons. It is intended that further work on this aspect of the leaf spot problem include an investigation of the effect of lengthening the interval between treatments during that period of the year when leaf spot infection is at a minimum. The use of a straight oil mixture is also contemplated.

NEW GRASS PLANTER SHOWS PROMISE.

A machine that will plant either sprigs or roots of the running types of grasses could have a far-reaching effect on Queensland farming, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently.

In soil conservation work, this machine is already outstanding in the grassing of waterways. It is also suitable for laying down permanent pastures of the running species of grasses.

The best waterway grasses, such as kikuyu, are not easily established from seed; therefore runners or roots must be planted. Hand planting is laborious and costly, and it is not surprising that this mechanical planter attracted the interest of Queensland soil conservationists.

After initial tests with an imported machine, the Agriculture Department, with assistance from the Commonwealth Government, arranged for a similar machine to be made at Toowoomba. During the 1956-57 summer, it was used to demonstrate the planting of kikuyu and African star grass in waterways on the Darling Downs. Over 50 waterways were planted in an area extending from Warwick to Dalby. Reasonable establishment was secured, but the subsequent dry weather has resulted in the loss of some of the planted material. However, sufficient remains alive to ensure a good start in the spring.

With the planter, the average waterway about 30 ft. wide and 40 chains long can be planted in three hours. By hand, the job would take the best part of a week.

A number of pastures have also been planted with this equipment at the rate of about seven acres a day.

Mr. Collins said the grass planter promises to speed up the rate of planting grasses for both soil protection and pastures. Mechanical planting of sprigs or crowns of the running types of grasses will encourage wider use of these species in areas with suitable rainfall.

Liming and Trace Element Problems in the Bean Crop

By L. G. TRIM, Adviser in Horticulture.

For satisfactory growth, plants need not only sufficient nitrogen, phosphorus and potassium but also certain trace elements which are used in only small amounts.

If adequate supplies of these trace elements are not available, the plants show abnormalities in growth and both yield and quality of the crop are reduced. Conversely, excessive amounts of some trace elements may produce toxic effects which, from the grower's point of view, are just as serious as those caused by deficiencies.

In the French bean, four trace elements—manganese, iron, molybdenum and boron—are of particular importance. Their availability to the crop is influenced by soil reaction (degree of alkalinity or acidity), which is measured in terms of the pH scale.

Manganese and Iron.

Manganese is closely associated with iron in the formation of chlorophyll, the green colouring matter in the plant which controls the assimilation of carbon dioxide from the air and consequently the formation of carbohydrates such as sugars and starch which are needed for healthy growth. When manganese is deficient in the soil, chlorosis (yellowing) of the leaves is a common symptom.

Manganese deficiency in the soil is comparatively rare in the more important bean-growing areas. An excess is much more common and produces symptoms which can be fairly easily recognised. The plants are stunted and have puckered leaves

which are yellow between the veins. Growth of the affected plants is so poor that they seldom produce any quantity of marketable beans. Only part, or parts, of the crop may show typical symptoms as the available manganese in the soil varies a great deal even over short distances in the same field.

Manganese is present in most soils in varying amounts and the form in which it occurs influences its availability to the plant. Soils with a high manganese content are found in the Mary Valley near Gympie, at Yeppoon near Rockhampton, at Coolabunia in the South Burnett, in some areas near Nambour and at Brookfield. In all these districts, manganese toxicity may be responsible for the complete or partial failure of bean crops unless corrective measures are applied by the grower.

Manganese toxicity can usually be corrected by applying lime to the soil. The rate of application in any particular soil depends on its acidity and sufficient lime must be used to raise the pH to at least 5.4.

Stunting in bean crops was a recurring problem in some parts of the Mary Valley a few years ago but it has been largely eliminated by occasional liming of the land before the crop is established.

Molybdenum.

The exact role of molybdenum in the plant has not yet been determined but this trace element is certainly concerned with nitrogen nutrition. Chlorosis and stunting are



Plate 1.

Bean Crop in the Gympie District. The bean is the most important vegetable grown in Queensland and is worth more than £1,500,000 to the State.

therefore distinctive symptoms of a deficiency in beans. They may be accompanied by death of the leaf margins.

Where a shortage exists, the production of nodules on the roots of leguminous plants is adversely affected, their ability to utilize atmospheric nitrogen is reduced and growth is impaired. Although this is not particularly important in the French bean, which matures its crop within three months and receives a fair amount of nitrogen in the form of fertilizer, it is a limiting factor to growth in longer-lived species such as some clovers.

Symptoms of molybdenum deficiency in the bean crop are most pronounced in highly acid soils. The

use of lime raises the pH of the soil, lessens the risk of the disorder appearing in the crop and has a beneficial effect on legumes generally, even in land where manganese toxicity is not a problem.

Boron.

Boron also is necessary for normal growth in the French bean. A deficiency is associated with stunted development of the plant. The stem becomes thick and brittle and tends to split lengthwise near the junction of the seed leaves—which are the first to appear above-ground. The normal green colour between the veins of the leaves is less pronounced than usual and, in acute cases, the growing point may be distorted or dead.

Unlike deficiencies of manganese and molybdenum, this disorder is accentuated by the application of lime. It may be due to lack of reserves of boron in the soil or the immobilisation of these reserves by excess calcium and magnesium. The former occurs in some infertile, acid soils, particularly when the land has been intensively cropped for many years. Lime-induced boron deficiency is more common in the clay loams of sub-coastal and inland areas which are neutral to alkaline in reaction.

Liming.

The term "liming" is used in a broad sense to cover the application of materials which neutralise excessive soil acidity. The best known of these are ground limestone, which contains calcium carbonate, and dolomite, which contains calcium carbonate and magnesium carbonate. The

neutralising value of ground limestone and dolomite is, for practical purposes, the same and they may be used at equivalent rates per acre.

In many districts, dolomite is preferred by the grower, since it supplies magnesium in addition to correcting excessive acidity. Where, however, magnesium deficiency is not important and ground limestone is a cheaper commodity, ground limestone is used.

The amount of "lime" required on any particular area depends on the structure and acidity of the soil. On the red clay loams of the Mary Valley, from one to two tons per acre is required to raise the pH from 4.4 to 5.4. On the lighter soils, a smaller quantity of ground limestone or dolomite would have the same effect.



Plate 2.

Iron Deficiency in Beans. The disorder is induced by excessive amounts of manganese in the soil and can usually be corrected by liming. Left, healthy plants; right, plant showing typical symptoms.

Quite apart from its neutralising value, lime has beneficial effects on the physical condition of the soil. When applied to a heavy clay loam, it reduces cloddiness and improves internal drainage. On the other hand, when lime is added to a sandy soil it tends to cement the individual particles together in "crumbs" and increase its water-holding capacity.

Lime is generally broadcast by hand over the surface of the ground. Special machinery is, however, available for the purpose and should be

used at least in areas which are large enough to warrant the purchase of the equipment.

Lime should be applied to the land and ploughed into the soil some time ahead of planting so as to allow neutralisation to proceed before the bean seed is sown. The precise period will depend on weather conditions, as neutralisation only takes place in the presence of soil moisture. As a working basis, ground limestone and dolomite should both be applied some four weeks ahead of planting.



CARE OF FROST-INJURED CITRUS TREES.

Injury to the foliage and young growth of citrus trees usually becomes apparent within a few days of a heavy frost. On twigs and old limbs, however, it may not show up for two or more weeks. Nevertheless, the full extent of the injury cannot be determined for several months, states Mr. A. J. Crocker, Adviser in Horticulture, Department of Agriculture and Stock. After a severe frost, die-back sometimes continues throughout the following season and nothing can be done to prevent it.

In a frosted orchard, no pruning should be done until new growth appears on the trees. By that time, the die-back should have ceased and the full extent of the damage will be clearly defined. If earlier pruning is attempted, some young limbs continue to die back while others which might have recovered may be removed during the operation. In addition, a second pruning will almost certainly be needed and this involves growers in further expense without any compensating benefit. Trees pruned shortly after they are injured by frost seldom recover as quickly as trees pruned at a later date.

Lightly damaged trees in which only the foliage and small twigs are injured require no treatment other than that ordinarily provided by routine cultural and other operations in the orchard. Pruning should be kept to a minimum until the following winter; the maximum amount of foliage should be retained to support the crop that develops during the following season.

After freezing temperatures have occurred in the orchard, citrus trees usually have a wilted appearance similar to that associated with lack of moisture in the soil. Frequently, water consumption by frost-damaged trees is substantially reduced during the following season and irrigation by rule and thumb procedures may have an adverse effect on production. Water should therefore be applied only after careful examination of soil auger samples shows it is required.

Stinkwort, A Weed New to Queensland

By S. L. EVERIST, Government Botanist.

Stinkwort (*Inula graveolens*) is a serious weed in New South Wales, Victoria and South Australia. Until recently the only record of this plant from Queensland was one plant found near a Brisbane wharf in 1919.

In March of this year, specimens of stinkwort were received by the Government Botanist with a report that the plant was growing thickly along the side of the main highway three miles from Wallangarra. It is possible that the seeds were blown off an interstate transport truck and that the weed may be growing unrecognized in other places within the State.

Stinkwort is an annual plant which grows mainly in the summer time. It has an upright habit of growth, with many short side branches forming compact plants up to 2 ft. high. The whole plant is covered with sticky glandular hairs which give it a powerful odour and make it clammy to the touch. The leaves, alternately arranged along the stems, are narrow and have no stalks. In the lower part of the plant they are 1½-3 in. long but become progressively smaller upwards. In autumn, numerous small yellow flower-heads appear in the forks of the upper leaves. When ripe, the heads expand and release the small brown seeds, each furnished with a tiny parachute of thistledown.

In southern Australia stinkwort has proved to be a serious pest in cultivation paddocks and also a bad weed in pastures, particularly those that are run-down or neglected. If the

plant is eaten by cows the milk is so severely tainted that the off-flavour cannot be eliminated in processing. If sheep eat stinkwort the mutton is said to be virtually uneatable. There is also evidence that the plant is a factor contributing to the onset of a disease in sheep known as enzootic toxæmia.

Fortunately, stinkwort is easily killed if taken in time. Where there are only a few plants or where they are growing in arable land, hand pulling, chipping or cultivation before the seeds ripen is the best method of attack.

Where this is not practicable, they can be killed by spraying with 2,4-D at the rate of 2 lb. per acre. If one of the 50 per cent. 2,4-D preparations which are available at cost price from the Department of Public Lands is used, 1 gallon of concentrate would be sufficient for 2½ acres, mixed with whatever quantity of water the spray equipment will deliver. If a knapsack spray is used, mix 2 fluid ounces of the 50 per cent. 2,4-D with 3 gallons of water and spray the plants until they are wet. The work should be done before the seeds are ripe.

At this stage, the most important thing is to recognize the plant and destroy it before it becomes established in Queensland. Any strange plants should be sent to the Government Botanist, Department of Agriculture and Stock, Brisbane, or the nearest officer of the Department of Agriculture and Stock, for identification.



Plate 1.

Stinkwort (*Inula graveolens*). Part of plant and details of leaf, flower, flower-head and seed.

[Drawn by Miss R. Simmonds, after E. A. King in "Control of Weeds", by K. G. Carn, N.S.W. Department of Agriculture and Rural Bank of New South Wales.]

PROMISING OPERATION OF ALL-METAL BUTTER CHURN.

The first all-metal fully insulated butter churn to be used commercially in Queensland has completed nine months' service at the Kingston butter factory. Its performance suggests that metal churns may eventually replace the conventional wooden churns in butter factories.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently that metal churns are a major advance in butter making equipment. Although more costly to install, they remove many of the handicaps of the wooden churns.

At Kingston, the metal churn has been working alongside wooden churns since last August. Commonwealth and State butter graders have observed no difference in the condition and texture of the butter from the churns.

Wooden churns are difficult to clean and butter often suffers from bacterial contamination. In use, wooden churns can deteriorate fairly rapidly, as the wood is subject to rotting. For this reason, great care is needed in the selection of the timber in the first place and in the actual treatment of the churn at the factory during manufacture and cleaning operations.

In recent years, wooden churns have been lasting only five to eight years before requiring repair or replacement. The life of a metal churn is estimated to be at least twice that of the wooden churn.

The main advantages of metal churns are that they are easily cleaned and the bacteriological quality of the butter is improved. They can be put into use immediately they are installed; no period of swelling prior to use is required as is the case with wooden churns.

The new type of churn, which is made in Queensland, is of mild steel, lined internally and sheeted on the outside with stainless steel. Its design enables it to be fitted to the existing framework and driving mechanism in butter factories.

Mr. Collins added that three other butter factories in Queensland now have metal churns on order.

DAIRY BULL PROVING SCHEME.

Three hundred and seventy-five Jersey heifers are making history in dairy cattle breeding in Queensland. They are calves from the first year's operations of the Agriculture Department's dairy bull proving scheme.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently that these calves will determine whether any of the four bulls used to produce them is an outstanding sire.

Queensland's bull proving scheme aims at identifying herd improving sires that would then be available for wider use in the dairy industry. Every year, four selected bulls are mated artificially with about 1,200 cows in different herds. Their breeding value is assessed on the production of their daughters. The scheme commenced in 1955.

Each of the four bulls in the first draft under test has now at least 90 daughters distributed throughout 54 production-recorded herds in the Nambour, Kenilworth and Maleny districts. Late this year the heifers will be artificially mated so that they will calve towards the end of 1958. By the end of 1959, the production records of their first lactation will have established the value of their sires as herd improvers.

A second set of bulls was put under test last year. In spring and early summer last year, a total of 1,267 cows was mated during an artificial breeding season of 82 days. Calves from the 1956 matings will be born between July and October this year. A single insemination only was necessary in 64 per cent. of the cows. This compares very favourably with artificial breeding results being obtained in overseas dairying countries. Natural fertility in Queensland is about 50 per cent.

Mr. Collins said that although management, which includes feeding, influences milk production more than breeding, herd improving sires do exist. In the past, however, it has been very difficult to find them. Modern methods of animal breeding have now greatly reduced the element of chance in identifying these sires. Queensland is tackling the problem through its bull proving scheme, and though it is a long-term project, progress is being made each year.

A Convenient Milk-Vat Stand

By R. HARTWIG, Dairy Officer.

The use of steel in place of wood in the dairy shed is becoming increasingly popular in Queensland. Its use brings many advantages to the shed.

In recent months several 1-leg steel milk-vat stands have been erected in the Nanango district. These stands are structurally strong, easy to clean and cheap to erect.

On most dairy farms the milk-vat stand is constructed of wood. Some have been braced to the wall of the air-space, but as milk and water have splashed onto this wall undesirable contamination has built up. Others have been built on four legs. This enables the vat to be moved away from the wall but has obstructed the cleaning of the milk-room floor.

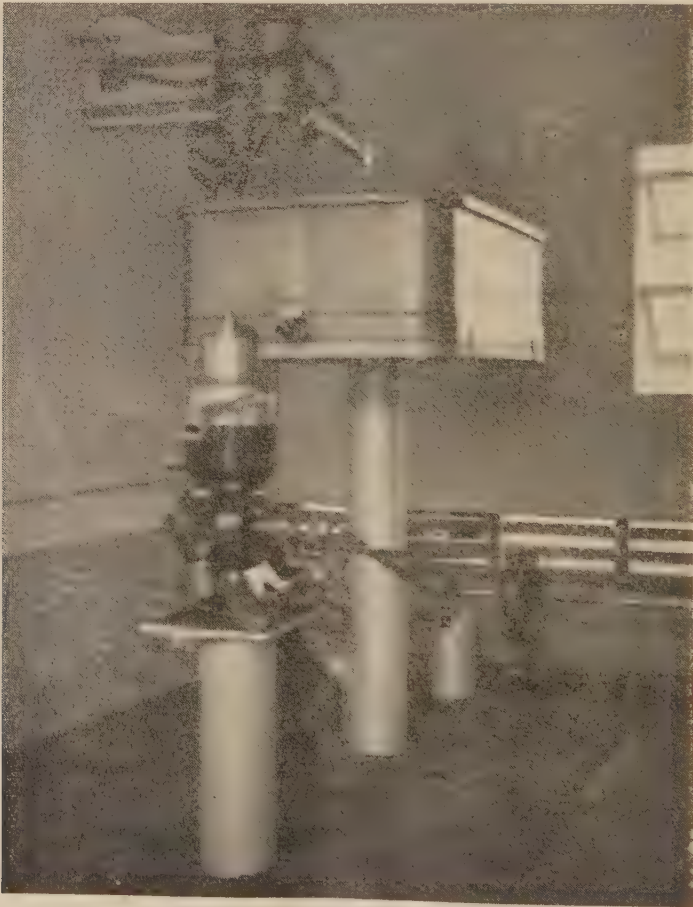


Plate 1.

View of Steel Milk-vat Stand on Messrs. L. Walsh & Son's Farm at Nanango.

A third type of stand can be suspended from the ceiling to overcome these two faults, but while this is successful it is difficult to ensure complete stability with this construction. With a large milk vat the stand requires additional bracing.

Wooden construction suffers from the disability that wood is porous and absorbs moisture unless it is suitably painted. In addition, wood deteriorates over the years.

A stand built of metal and supported on one leg overcomes these many disadvantages of the wooden type. A suitable type is shown in the illustration.

CONSTRUCTION.

The materials required for this milk-vat stand are:—

(1) 6 ft. of 5 in. bore casing or similar material. To obtain increased stability this column can be filled with concrete.

(2) A length of $1\frac{1}{2}$ in. $\times$ $\frac{1}{4}$ in. angle iron. This length is equal to twice the width of the milk vat and the two strips are welded on to the central column.

(3) A length of $1\frac{1}{4}$ in. $\times$ $\frac{1}{8}$ in. angle iron. This length is used for forming the frame supporting the vat and is equal to the external circumference of the vat.

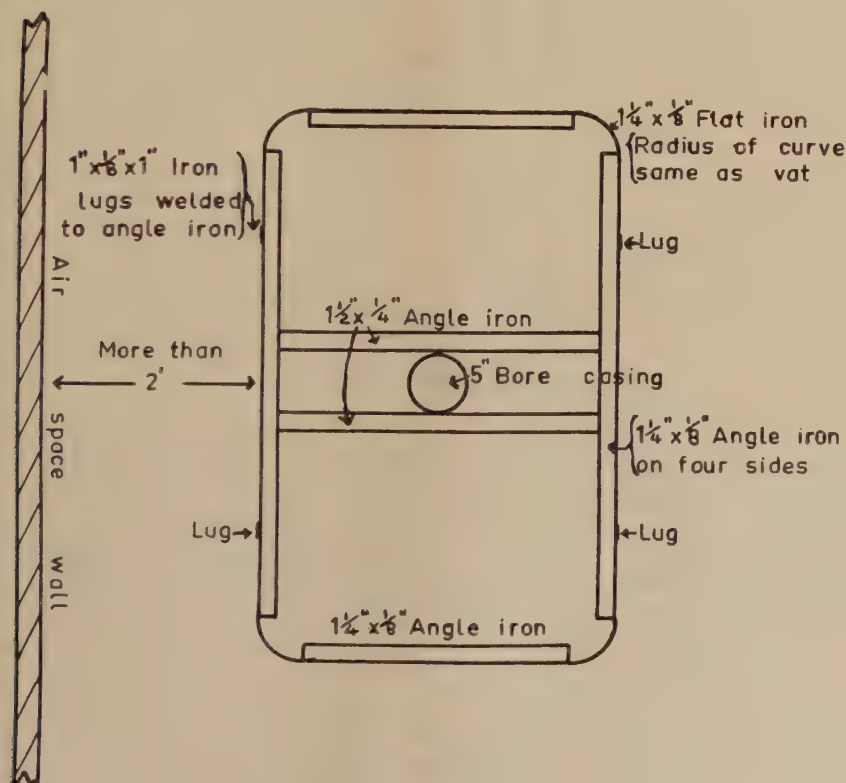


Plate 2.

Plan of Milk-vat Stand.

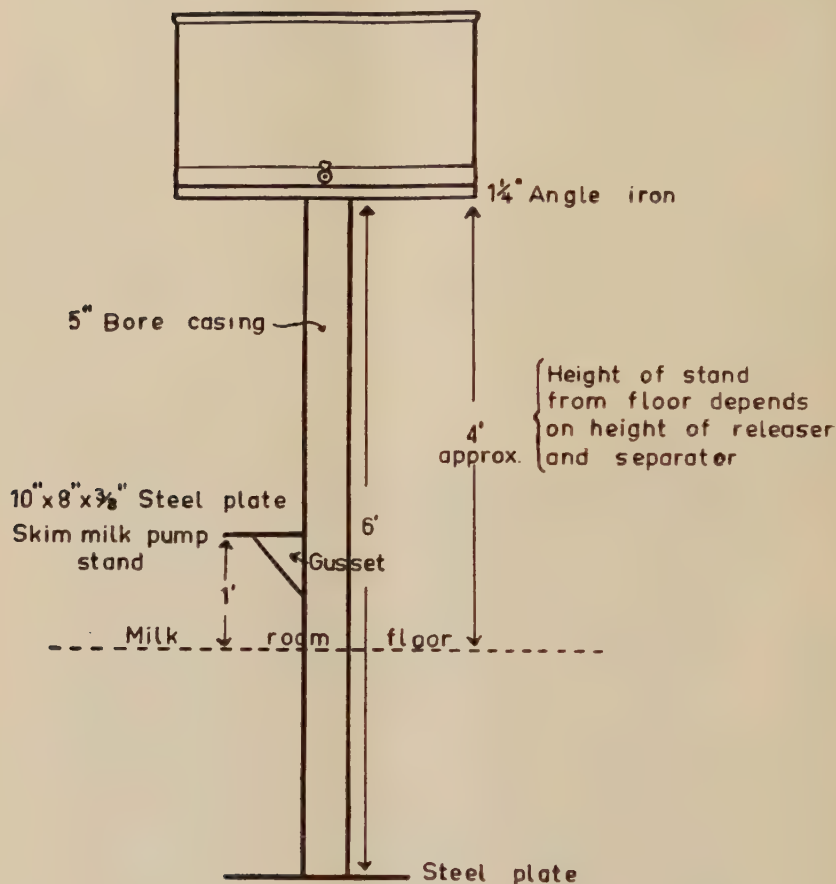


Plate 3.

Elevation of Milk-vat Stand.

(4) A 2 ft. length of 1 1/4 in. x 1/8 in. flat iron. This iron is used to form the corners of the angle iron vat frame.

(5) Four 1 in. lugs of 1 in. x 1/8 in. flat iron.

(6) A plate of 10 in. x 8 in. x 3/8 in. iron for a skim-milk pump (if required). A flat angle bracket to support this plate.

Details of the erection of this stand are shown in the elevation and ground plans.



The Profit and Loss of Concentrate Feeding

By A. HUTCHINGS, Senior Adviser (Cattle Husbandry).

Under Queensland conditions the dairyman's income is roughly proportionate to the amount of pasture, crops and conserved fodders grown on the farm.

Most cows will produce a high proportion of their potential production off good roughage alone. However, high producers cannot eat sufficient roughage for maximum production, so supplementary feeding of concentrates is necessary to obtain this yield.

It does not pay to feed concentrates to low producers, but in certain circumstances it may pay to feed concentrates to cows known to be capable of high production.

During the summer when there is plenty of pasture for grazing, it is not profitable to feed heavily on concentrates. This is because concentrates replace some of the feed the cows are already grazing. Concentrate feeding under such conditions is a dead loss.

This teaches an important lesson—the first step towards higher and profitable production is to improve pasture and crop grazing.

Where cows are almost entirely stall-fed, the concentrate is additional to the feed and does not simply replace some feed. There will thus be an increase in milk yield and thereby some profit. When cows are completely stall-fed—and this is a big job—you can calculate the expected increase in individual yields and you'll get a good proportion of it—if you know your cows' capability for production.

This brings up another important factor in concentrate feeding. It is most profitable to feed according to

individual yields. Therein lies one of the values of herd recording. Should you not know your yields, don't guess, because you will often be guessing wrong; the next best procedure is to feed according to stage of lactation.

A daily concentrate feeding schedule on that basis could be 4 lb. during the first three months, 3 lb. during the next three months, and a tapering off during the final three months. You may say, "But the cow will be dry before this." No, most of your cows will be still worth milking if you feed them well enough!

Now, wholemilk producers who have to keep up their winter supply—to hold their winter quota—must feed concentrates during the winter. There will be little or no pasture feed, but in favourable seasons some grazing crops are available. Hay or silage helps a lot. At present there is not enough winter crop grown or feed conserved, but the problems associated with this are being met.

The protein content of concentrate required in winter depends on the type of roughage the cows are getting. With protein-rich roughage such as young crops, lucerne or clover pasture, a meal with 12-15 per cent. protein is desirable. When pasture is seeding or when maize and sorghum silage form the bulk of roughage feed, a 20 per cent. protein concentrate is required.

These are the main factors affecting the profit in concentrate feeding—

- (1) For cream suppliers there is little profit from concentrate

feeding when the cows are regularly fed all the good roughage they can eat. Good yields off all-grazing may be as profitable as higher yields with concentrate feeding.

- (2) Pasture is the cheapest feed, followed by grazing crops, conserved fodders and concentrates.
- (3) It is profitable to feed concentrates to cows for wholemilk supply when there is not enough roughage. This condition regularly occurs, particularly during winter.
- (4) It pays to feed concentrates to maintain or build up the

winter milk quota. At this time, 2 lb. of meal, or even 3 lb., can be fed per gallon of milk produced.

- (5) It is most profitable to feed proportionate to individual yields, whereby the best producers receive the most meal.
- (6) Finally, the foundation of economic feeding of concentrates is good pasture, crops and conserved feeds.

For further information on this subject, contact your local cattle husbandry officer or write to the Department of Agriculture and Stock, Brisbane.

COUNTERING THE SAWFLY.

Sawfly poisoning is a puzzling problem in parts of Queensland's cattle country. The main danger zones are the silver-leaf ironbark areas of the Maranoa and Upper Burnett. Although the sawfly is active almost every year, a moderately heavy death toll occurs only in irregular outbreaks.

Mr. K. M. Grant, Assistant Director of Veterinary Services, Department of Agriculture and Stock, states that 3 lb. of larvae is sufficient to kill a steer.

In early winter, great numbers of sawfly larvae hatch in the silver-leaf ironbark trees, which they quickly strip of their foliage. As the food supply is reduced, larvae descend to the ground, where thousands die of starvation, forming black, decaying heaps at the foot of the trees. It is the eating of these unpleasant heaps of dead larvae that makes sawfly poisoning an unusual disease. However, once cattle acquire a liking for this abnormal food they eat it greedily. They will even run in mobs from tree to tree, fighting and horning, in an attempt to get more.

No treatment has yet been developed for sawfly poisoning. Eradication of the sawfly is not practicable, but it is possible to destroy the silver-leaf ironbark on which they feed. Small properties could be ringbarked completely. On the bigger holdings, small fenced areas could be ringbarked and held in readiness for an outbreak of sawfly poisoning. Ringbarking the narrow-leaf and grey ironbarks is not recommended. These are valuable timbers and are not major food trees for sawfly larvae.

The depraved appetite that causes stock to eat sawfly larvae may be due to a deficiency of protein or phosphorus. It is a matter of experiment to see if supplying suitable supplements will overcome the craving for larvae.

From laboratory experiments, a great deal has been learnt about sawfly poisoning, but further research is necessary. Mr. Grant asks graziers who have heavy sawfly infestations on their properties, especially if they are losing stock, to advise their local Veterinary Officer or Stock Inspector.

Deep-Litter Pig Pen Demonstration

By G. SJOQUIST, Assistant Adviser, Pig Branch.

Because of the increasing interest in rearing pigs on the deep-litter system, a demonstration of this system on a commercial scale has been put in train by the Department of Agriculture and Stock.

With the co-operation of the management of the Salvation Army's Training Farm for Boys, Riverview (20 miles from Brisbane), five pens have been completed. The pens are built exclusively for deep-litter rearing of pigs and have special features to suit this purpose.

The floor area of each pen is about 70 sq. ft., which is the minimum area for seven pigs up to bacon size. It has a 2-ft. wide concrete platform in the front, raised one foot above the floor level, to accommodate trough or self-feeders and an automatic drinking bowl.

Special consideration has been given to ventilation by providing a big louvre in the back of each pen. This opening is also used for easy removal of the sawdust litter. The partitions are kept low to allow a free flow of air throughout the pens. The height from floor to roof (8 ft.) also allows the air to circulate freely.

The importance of good ventilation lies in the fact that sawdust litter, when working properly, develops heat, and this combined with high outside temperatures in the summer could make conditions very uncomfortable for the pigs.



Plate 1.

Front View of the Deep-litter Demonstration Pens at Riverview.

The outside walls are boarded up to within a foot of the roof at the back and sides. The front is open-boarded to a height of 3 ft. 3 in. and a 2 ft. 3 in. gate is provided for each pen.

The row of pens is facing east and the roof of each is sloped in the same direction, with a 6 in. rainwater gutter in front. The roof is extended 3 ft. over the front partition to give protection from the sun and driving rain and also to shelter a 3 ft. footpath.

The footpath is sloped towards the feeding platform, but is 5 in. lower than this at the junction, thus forming a drain right along the front of the pen.

The floor, side partitions and back wall are of 4 in. concrete and, with the feeding platform raised 1 ft. above floor level, form a well in which the sawdust litter is placed and may accumulate to a depth of approximately 12 in.

To encourage the pigs to root through the sawdust and mix it with the manure and urine, whole grains of maize or other cereals may be scattered over the litter when thought necessary.

If the pigs insist on using one corner for their convenience, which most pigs do, this corner is dug up and spread over the rest of the litter and replaced with fresh clean sawdust.

In the demonstration at Riverview, the flies are controlled with a new fly-spray and bait containing diazinon. The spray has a residual effect lasting about two weeks. After spraying, the fly bait is used. This is a granulated blue bait on a sugar base and is sprinkled thinly in trays suspended from the rafters under the roof.

The sawdust litter is also turned over along the cement walls, where the heat of the litter is considerably less, and the fly larvae killed with the spray.



Plate 2.

Rear View of the Pens, Showing the Large Louvre on Each Pen.

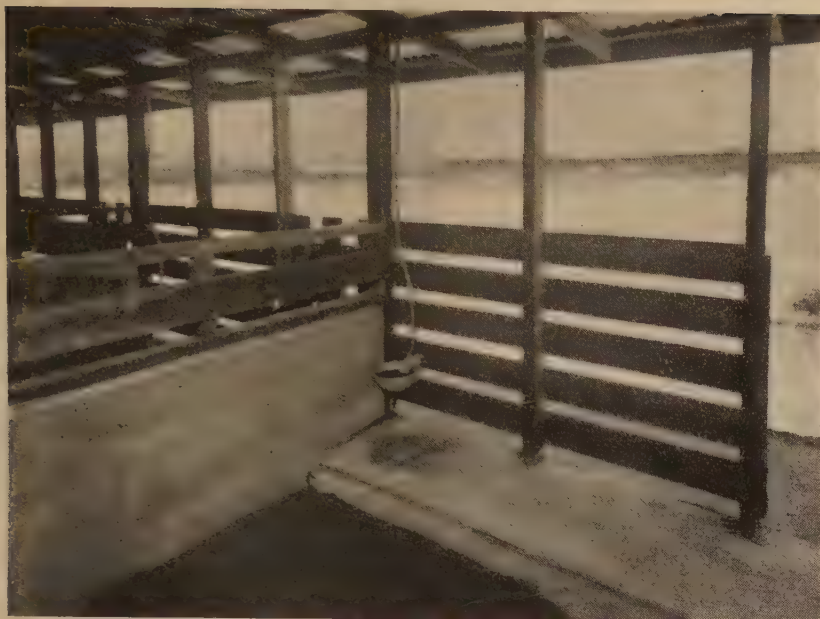


Plate 3.

Interior of Pen, Showing the Well Partly Filled With Sawdust and the Raised Platform for a Self-feeder or Trough and a Water Fountain.

At present a demonstration of restricted feeding is in progress, using the pigs in the deep-litter pens. This is carried out in order to show how to overcome the tendency of the pigs to become overfat. Any potential deep-litter pig producer must be prepared to control this tendency, as the limited area of the pens reduces the amount of movement necessary for vigorous exercise.

With the restricted feeding, the intake of digestible food is reduced by replacing 5-10 per cent. of the grain in the ration with a bulky fibrous meal, such as lucerne meal, oats or wheaten bran, thus slowing down the growth rate and fat accumulation, with a resultant improvement in the carcase quality. The supply of minerals and vitamins must also be watched closely, because when keeping pigs away from their natural surroundings the necessity of supplying everything required by the

pigs for satisfactory development and health is quite obvious.

The pigs are weighed regularly so a check can be kept on weight gain-food consumption and food conversion rate.

This is a simple feeding trial any pig producer could find time and means to do on the farm, and it would greatly assist him in planning his production and costs.

The loss of time due to the delayed maturity of the pigs, together with the increased food intake, could be offset if the preserved manure in the deep-litter could be used to advantage. On a recent trial with oats and tares manured with deep-litter pig manure, the yield of the treated crop was up to four times as great as that of the untreated crop. On farms where a high yield per acre is imperative, the deep-litter system of pig raising is one way of assisting this at a very low cost.

CROP FORECASTING EXTENDED.

The Marketing Division of the Department of Agriculture and Stock has extended its crop forecasting system to cover additional grain and seed crops.

Up to the present, forecasts during the winter grain season have covered only wheat and barley, but in future oats, linseed and canary seed will also be included. The Division also hopes to extend its summer grain forecasts, now limited to maize and grain sorghum, to include white French millet and setaria.

Production of some of these crops, particularly linseed and canary seed, has expanded rapidly during the last few years and these seed crops now occupy an important place in Queensland agriculture.

The demand by growers, marketing authorities and merchants, both here and overseas, for reliable information on likely production was a major factor in the Marketing Division's decision to extend the range of grain crop forecasts.

Queensland's crop forecasting system functions through the co-operation of selected farmers who act as honorary crop correspondents in the producing districts, and the expansion of the scheme will require the appointment of additional correspondents.

The first survey for the 1957 winter grain season is now in progress.

MARKETING AVOCADOES.

Poor market presentation of avocados is costing Queensland growers many customers on southern markets. The avocado is now becoming established on the fresh fruit market, but to hold its position the fruit must be attractive.

Mr. C. G. Williams, Supervisor (Preparation and Transport), Department of Agriculture and Stock, explains that immature fruit is one of the greatest hazards. It proves itself unpalatable, develops mould, and cannot command a market. Growers, therefore, should not harvest their fruit until it is mature. Because the skin and flesh of bruised avocados quickly turn black, even slightly marked fruit should not be sent to distant markets. By the time it has arrived it will have become unsaleable. Of course, the obvious solution is to take great care in picking, selection, and packing.

In the south, market preference is strongly in favour of the pear-shaped Fuerte variety. Growers should arrange for Sydney deliveries to arrive there early in the week, preferably on Mondays. This is because mature avocados become soft after a few days. Early delivery allows retailers to clear stocks by the week-end. Supplies arriving late in the week are often cleared at very low prices.

Cases carrying an attractive coloured label marked "avocados" and stamped with the number of fruit in the case give a consignment a distinct advantage. Another advantage is to have instructions on the various uses of avocados printed on the fruit wrap. Many potential buyers are not yet familiar with the eating qualities of the avocado, and the printed wrap would be a helpful introduction. In packing, the fruit should be graded for size and quality. The pack should be well ventilated. For distant markets, fruit wrapping paper of suitable size should be loosely placed around each fruit. Woodwool and shredded paper are unsuitable as packing materials in multiple layer packs as they restrict ventilation.

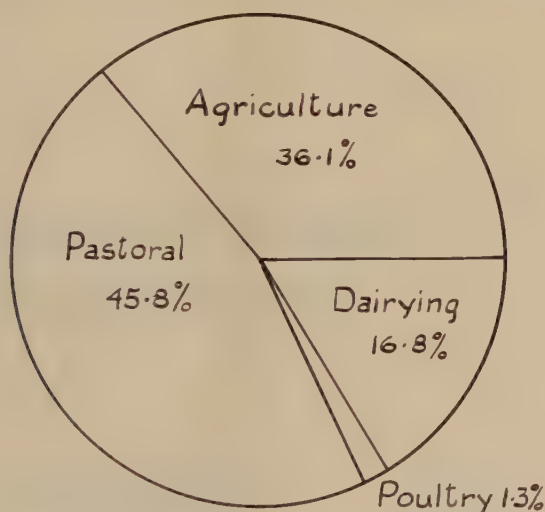
Packing charts prepared by the Agriculture Department are available free to growers. Growers within a reasonable distance of Brisbane may, on application to the Department, receive personal instruction in packing avocados.

Agricultural, Dairying and Pastoral Statistics— Why They are Needed

Contributed by the Government Statistician's Office.

In common with those of other States, farmers and pastoralists in Queensland, some 43,000 of them, are called on to complete agricultural and pastoral returns at the end of March each year and to forward them to the officer in charge of police in their district within 30 days.

These are sent on to the Government Statistician's Office without delay and the particulars contained in the returns are then tabulated and summarised to provide information for each police district, local authority, statistical division, and the State. Queensland figures are

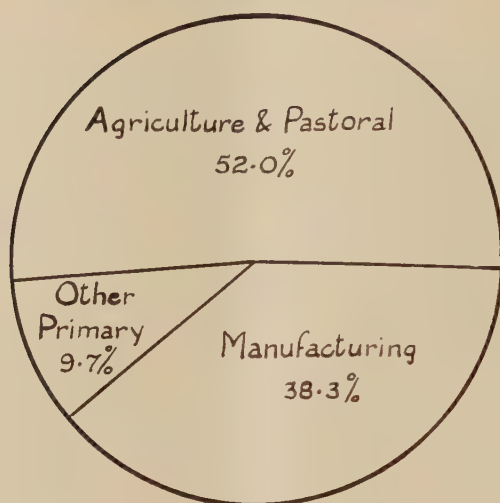


Gross Value of Rural Production

	£m.
Agriculture	76.1
Pastoral	96.7
Dairying & Pigs	35.4
Poultry & Bees	2.7
Total	210.9

Plate 1.

Gross Rural Production in Queensland, 1955-56.



Net Value of Production

	£m.
Agriculture, Pastoral, &c.	169.5
Mining, Forestry, Fishing, &c.	31.5
Manufacturing	124.9
Total	325.9

Plate 2.

Net Value of Production, Queensland, 1955-56.

included with those from other States to make Australian totals and these in turn form part of world totals.

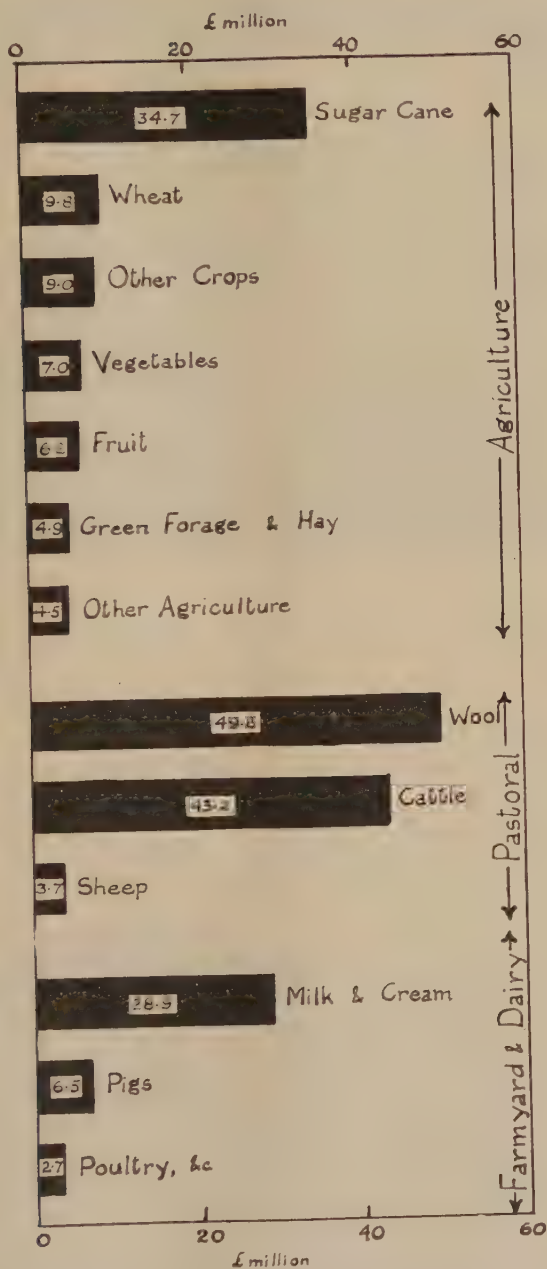
While the return at first sight seems a lengthy one, everything asked for is essential and designed to yield information on some aspect of the State's rural industries.

With agriculture widely distributed over the eastern part of the State from the tropical areas of the north to the cooler parts in the south, Queensland production covers a wide variety of crops, including wheat and other grains, fruit and vegetables of every description, sugar, tobacco, peanuts, as well as many other miscellaneous crops. Information regard-

ing these alone requires a lengthy form.

Further information on livestock, dairy and poultry production, and beekeeping, as well as on wool by means of a separate return, is necessary to obtain the total rural production of the State.

The remaining sections of the return indicate, among other things, the use being made of the land comprising each rural holding, the degree of mechanisation, the use of fertilizers and irrigation, the numbers dependent on rural industry for their livelihood, and the payments by way of wages and contract amounts paid to permanent, seasonal and contract workers.



Total Gross Value of Rural Production
in 1955-56 = £210,900,000.

Plate 3.

Value of Rural Production, Queensland, 1955-56.



Plate 4.

A Fine Merino Fleece. There are 22 million Merino sheep in Queensland. Record wool production was 214,000,000 lb. in 1941-42. Production in 1955-56 was 186,000,000 lb.

Full Details Wanted.

While it is necessary to have full and complete information on a State basis for all the items on the form, individual farmers and pastoralists will usually not be concerned with a number of the items listed. On the average, only one in nine of the questions asked apply to any particular holding. Though the actual information sought of the operations on any one holding will generally cover only some parts of the form, it is essential that all appropriate sections relating to a holding be completed. The questions asked have been kept simple and direct, requiring usually a figure for an answer (for example, number of acres sown—5; tons produced—25).

A form of instructions is supplied to a producer with each return form to clear up any doubts that may arise as to who should furnish the

returns for holdings occupied by tenants or sharefarmers and to ensure that figures are supplied on the correct basis desired for statistics. Care taken in the preparation of the return will do away with the necessity for later correspondence and assist materially in enabling the Government Statistician's office to obtain figures of the State's rural production at an early date each year. A person filling out a form is asked to keep in mind that each return refers to the full activities of each rural holding and that the shares of produce, stock, &c., of sharefarmers, members of families and others are to be included as well as the occupier's own operations.

Returns Confidential.

Statistical returns of primary producers are strictly confidential to the Government Statistician. The Statistician's staff and the police collectors

treat individual returns as secret documents. Their contents are not divulged to any Government department, board, company, firm, or person and they have no connection in any way with taxation returns. Statistical returns should be completed when due and not held up for financial data generally required for income tax returns.

Uniformity for Australia.

The year or season ended March 31 was adopted for agricultural and pastoral statistics by all the Australian States and is the year which best suits the growing seasons and harvesting of crops in all the States. Farmers are asked to provide information for each crop for the season indicated on the form and should not quote figures for any other year or season. The return form and instructions for use each year are prepared after very full consideration. Each question should be read literally and the appropriate data supplied.

Uses of Statistics.

The question will naturally arise in many minds as to the necessity for these returns, and as to what uses are made of the information when it is compiled.

In this regard it is pointed out that when the year's figures are completed, there is available a complete record amongst other things of each item of rural production for every police district, local authority area, and statistical division of the State and for the State itself. Various comparisons can then be made between districts, seasons, and years, and these are of great importance in determining agricultural and pastoral policy, and in rendering an account of the State's progress as a whole or of districts. Whether an individual producer believes in more or less public control of the production and marketing of his output, it is clearly to his interest to assist in providing accurate statistics, so that



Plate 5.

Sugar Cane Farms in North Queensland. Sugar cane is grown on 7,000 farms in Queensland. Record production was 9,864,000 tons in 1954. The 1956 yield was 8,985,000 tons.



Plate 6.

Linseed, a Relatively New Crop, But an Important One. The area under linseed increased from 112 acres in 1947 to 114,000 acres in 1956. This was worth £1,400,000.

all discussions of policy can be based on sound premises.

These figures are of great interest to the Department of Agriculture and Stock and provide a valuable record of the success or failure of various crops in different areas. New strains of wheat, hybrid maize, new types of sugar cane, and various other crops are being continually developed to assist farmers, and the success or otherwise of any of these new types is a matter of great concern to this Department and the Bureau of Sugar Experiment Stations. The progress made by crops newly introduced into the State and of new breeds of livestock is also of great interest and importance.

The effects of such things as the use of fertilizer and irrigation; of fodder conservation and pasture improvement; of herd recording and other activities are gauged largely from the statistics of rural production.

Very extensive use is made of the figures by machinery firms, fuel companies, tractor and vehicle distributors, manufacturers utilizing primary products for processing, wool and produce firms, financial institutions, and others, as well as primary producers' own associations.

Statistics of Holdings.

By far the largest portion of Queensland's rural area is used for the grazing of livestock utilizing

native grasses, and in a number of districts, introduced or improved pastures, but the area used for crops is nevertheless nearly 3,000,000 acres. Of the 43,500 holdings for 1955-56, there were 30,800 with cultivation and it is known that millions of acres more are suitable for the growing of crops.

Dairy cattle totalling 1,384,000 were on 27,700 holdings; beef cattle numbering 5,946,000 were on 11,800 holdings; 373,000 pigs were on 13,800 holdings; and the very large number of 22,116,000 sheep were on 5,900 stations and farms. Commercial poultry flocks numbered 850, but practically every holding had some poultry, providing for home use or for sale as side-line production. There were 700 beekeepers.

Some holdings are small, most are large or very large, but they are all included in the tabulations. Many

holdings in Queensland have mixed activities, so the number of holdings under each heading cannot be added together to make the figure of 43,500 for total holdings.

Value of Production.

The importance of rural industry to Queensland is well known, and is clearly illustrated in the graphs included in this article. For the year 1955-56 the gross value of rural production for Queensland was estimated at £210,900,000, of which the pastoral industry contributed 45.8 per cent., agriculture 36.1 per cent., dairying (including pigs) 16.8 per cent., and poultry and bees 1.3 per cent.

Gross values of main items of production were:—Wool, £49,800,000; beef cattle, £43,200,000; sugar cane, £34,700,000; milk and cream,



Plate 7.

Tobacco is a Valuable Crop. The record production of cured leaf was 4,667,000 lb. in 1951-52.



Plate 8.

Beef Cattle in a Grazing Paddock. Queensland has 52 per cent. of all Australia's beef cattle. Slaughterings for food in 1955-56 were 1,153,000 cattle and 362,000 calves.



Plate 9.

Dairying is a Major Industry. There were 916,000 dairy cows in the State in 1956. Production in 1955-56 was—Total milk, 282,300,000 gallons; butter made, 108,730,000 lb.; cheese made, 16,980,000 lb.

£28,900,000; wheat, £9,800,000; pigs, £6,500,000.

Judged on net value of production of commodities for the latest year the rural industries provided 52.0 per cent. of the total figure, manufacturing 38.3 per cent., and mining, forestry, &c., 9.7 per cent.

Prompt Lodgement Important.

The Statistician relies on co-operation from farmers and graziers with his office and the police collectors in his efforts to make a complete collection of returns to cover all the holdings of the State and all the production from them. Legal power exists to demand statistical returns but action to enforce penalties is rarely ever necessary. Co-operation is much preferred.

Most returns are lodged in good time. However, an appeal is made for the early lodgment of returns by the small number of producers who at present run late. Returns should be lodged with the police or sent

direct to the Government Statistician as soon as possible after the due date of March 31 each year. Wool returns are wanted immediately after June 30.

Statistics are always very valuable but have most value when figures can be made available at the earliest possible time. The early lodging of returns greatly helps to achieve this object. The statistics are of national and even international importance.

Requests Welcomed.

Should producers' associations, junior farmers' clubs, or individual producers desire at any time to have statistical information relating to their districts or industries, requests made to The Government Statistician, 42 George street, Brisbane, will receive prompt attention. The Statistician will also make information available to country newspapers whenever requested or by way of ordinary press releases as time and staff permit.



Plate 10.

Tractor Hauling a Weighted Disc Harrow. There were 42,800 tractors in the State in 1956. In 1939 there were only 8,500.

A General Review of Primary Producers' Co-operatives in Queensland

By D. R. LEWIS, Division of Marketing.

A co-operative society or association may be defined as a group of people who have come together for the purpose of producing and/or trading in goods for their mutual benefit, any distributable profits from such enterprise being shared amongst the members. Each member of such an association has one vote only irrespective of the number of shares held by that member.

The co-operative movement has taken different forms in various countries. In the United Kingdom, for example, the emphasis has been on consumers' co-operatives—wholesale and retail stores. This type of co-operative is also expanding in the Far Eastern countries, particularly in India and Ceylon. Here in Queensland, on the other hand, the emphasis has been on producers' co-operatives, in the main those concerned with rural industry. This is not to say, however, that there has been no development in consumers' co-operatives.

A co-operative, as its name implies, is, in essence, a voluntary organisation, but in Queensland we have also developed a form of compulsory co-operation, typified by the various marketing authorities.

So we find that Queensland legislation provides for three types of co-operative associations. These are as follows:—

(a) *The Primary Producers' Co-operative Associations Acts*,

1923 to 1934, catering for producer co-operation.

(b) *The Co-operative Societies Acts*, 1946 to 1951, catering mainly for consumers' co-operatives.

(c) Legislation providing for the "compulsory" co-operation of primary producers, such as *The Primary Producers' Organisation and Marketing Acts*, *The Wheat Pool Acts* and, in some respects, *The Fruit Marketing Organisation Acts*.

In this article we shall concern ourselves only with (a) and (c)—that is, primary producers' co-operation.

Voluntary Co-operatives.

Most of the associations registered under the Primary Producers' Co-operative Associations Acts are formed with the principal object of receiving members' produce, disposing of it as such or in processed form, and returning the proceeds to the members.

About 96 per cent. of our butter and 80 per cent. of our cheese are manufactured by co-operative associations registered under these Acts. The manufactured products are marketed through the Butter Marketing Board and the Cheese Marketing Board. Similarly, the bulk of the bacon produced in the State is manufactured by co-operative bacon associations.

At the end of 1956 there were 125 active primary producers' associations, as follows:—

Type of Association.	No. of Associations.
Fruitgrowers	19
Sugar	8
Cattle/Sheep Dips	36
Butter Factories	12
Cheese Factories	10
Butter and/or Cheese and/or Milk	16
Bacon	4
Miscellaneous	20
TOTAL	125

Finance.

One of the basic principles of the Primary Producers' Co-operative Associations Acts is that three-fifths at least of the number of shares and of the voting power of an association must always be held by persons who are producers and suppliers to the association of the produce in respect of which the business of the association is being carried on.

An association may be formed in one of three ways—

- (1) With share capital, and with the liability of each member limited to the nominal value of shares held by him.
- (2) Without share capital, and with liability limited to its assets.

- (3) Without share capital, and with unlimited liability.

There are no associations registered with unlimited liability. Most have share capital with limited liability but there are some with no capital and their liability limited to the value of the assets. At June 30, 1956, there were 104 societies in the former category and 21 societies in the latter category.

Unlike a joint-stock company it is not necessary for a co-operative association to have a fixed nominal capital. The capital is variable in accordance with the number of shares issued from time to time.

Finance is available to primary producers' co-operative associations from various sources—

- (a) Commonwealth Bank of Australia.
- (b) Private trading banks.
- (c) Queensland Agricultural Bank.
- (d) The State Treasury (in special circumstances).
- (e) Levies on producer members.
- (f) Share subscriptions.

The co-operative dairy associations obtain the bulk of their capital from shares subscribed by their members. Most of the capital of the sugar milling associations, some of which have large turnovers amounting to

TABLE 1.
PRIMARY PRODUCERS' CO-OPERATIVE SOCIETIES.
(YEAR ENDED JUNE 30.)

	1940.	1947.	1955.
Number of Societies	114	124	125
Number of Members	61,156	75,836	96,169
	£	£	£
Sales	14,261,649	15,153,435	48,221,512
Dividends on Share Capital	40,137	56,727	156,377
Paid-up Capital	1,406,608	2,058,119	4,524,348
Loan Capital	1,008,411	488,618	2,453,706
Bank Overdraft	994,405	1,009,863	5,576,428
Reserve Funds	1,331,631	2,253,388	4,800,333
Assets	7,399,692	9,143,721	25,586,709

(Source : Queensland Government Statistician.)

£2,000,000 per annum, is obtained by levying the produce supplied by members.

Loans to co-operatives by private banks may be backed by Government guarantee, which is not available to joint stock companies.

Table 1 gives a broad view of the growth of primary producers' co-operatives.

Marketing Boards.

We now come to those co-operatives in which there is an element of compulsion. Marketing boards are set up under the Primary Producers' Organisation and Marketing Acts.

The initiative for the formation of a marketing board, as with any other co-operative association, must come from the growers. The form of request is by petition to the Governor in Council, signed generally by not less than 50 growers of the commodity concerned.

The next stage is the issue of a Notice of Intention to set up a board, which notice may be challenged by a petition for a poll of growers. On receipt of a petition, a poll of growers is held and a board may be set up

only if at least 50 per cent. of those entitled to vote exercise their right to vote, and at least 60 per cent. of the votes polled are in favour of the proposal.

It is here that we find the element of compulsion, in that a 60 per cent. favourable vote binds all growers of the commodity.

Unlike primary producers' co-operative associations, which have no fixed period of existence, marketing boards are constituted for a specific period of time. Their period of operation may be extended for further periods, subject on each occasion to a Notice of Intention and a poll of growers if such is petitioned.

The management of the affairs of a board consists of elected representatives of the growers concerned and a Government Representative in the person of the Director of Marketing, or, in his absence, a deputy appointed by the Minister.

At the end of 1956 there were constituted under the Primary Producers' Organisation and Marketing Acts 10 Marketing Boards operating on a State-wide basis, and four boards concerned with the marketing of

TABLE 2.
QUANTITIES OF COMMODITIES HANDLED BY VARIOUS MARKETING BOARDS.

Board.	Unit.	Average 1939-40 to 1943-44.	Average 1944-45 to 1948-49.	Average 1951-52 to 1955-56.
Atherton Tableland Maize ..	tons	14,704	13,433	12,960
Barley	bus.	61,685	93,928	1,304,370
Broom Millet	tons	72	78	41
Butter	boxes	2,025,232	1,718,087	1,702,040
Cheese	lb.	18,892,830	21,093,399	16,307,305
Cotton	bales (a)	8,528	1,434	2,808
Egg (South Queensland) ..	doz.	6,457,094	9,793,035	7,721,214
Egg (Central Queensland) ..	doz.	..	547,168 (c)	163,791
Ginger	lb.	418,236 (b)	1,399,502	128,080
Navy Bean	bus.	..	19,416 (d)	18,380
Northern Pig	pigs	13,771	10,977	10,234
Peanut	lb.	14,896,578	33,549,932	24,426,620
Tobacco Leaf	lb.	..	2,287,823 (e)	4,498,664
Wheat	bus.	4,644,724	7,497,230	12,146,723

NOTES : (a) Equivalent ginned. (b) Average 1942-44. (c) Average 1947-48 to 1948-49.
(d) Average 1946-47 to 1948-49. (e) 1948-49 only.

certain commodities on a regional basis only, as follows:—

State-wide Marketing Boards—Barley, Broom Millet, Butter, Cheese, Cotton, Ginger, Grain Sorghum, Navy Bean, Peanut, Tobacco Leaf.

Regional Marketing Boards—Atherton Tableland Maize, Egg (South Queensland), Egg (Central Queensland), Northern Pig.

The quantities of commodities handled by these boards are given in Table 2.

Of all the marketing schemes inaugurated under the Primary Producers' Organisation and Marketing Acts and other legislation, only one has been voted out of existence by growers at any of the periods when the question of their continuance has been placed before them.

The State Wheat Board, although constituted under a separate Act of Parliament, operates similarly to the above boards.

The Committee of Direction of Fruit Marketing, generally referred to as the C.O.D., is constituted under the Fruit Marketing Organisation Acts. Briefly, the C.O.D. is composed of representatives elected by the six Sectional Group Committees, together with the Director of Marketing.

The C.O.D. is empowered by the Acts to do all things deemed necessary or convenient in the marketing of fruit or vegetables. To this end the C.O.D. may issue a "Direction" that any particular class of fruit shall be marketed only through the C.O.D. or persons appointed by it. As in the case of the setting up of a marketing board, a Notice of Intention must be issued, and this can be challenged by a petition and poll of growers.

A poll in favour of the "Direction" binds all growers concerned with the particular commodity. Ordinarily a

grower may sell his produce through either the C.O.D. or other agent as he wishes. The "Direction" function has been used by the C.O.D. almost exclusively for fruit for factory processing.

Finance.

(a) *Marketing Boards.*

Boards are required to return to the growers the net proceeds of sales less administration expenses, dockages where applied, and any levies which may be made for particular purposes.

The general method of payment, in the case of pooled products, is by means of a first advance at the time of delivery, and further advances as the crop is disposed of.

At the outset the boards were assisted in their financial arrangements by means of loans arranged with the Commonwealth Bank, under Government guarantee. Since the passing of the Commonwealth Rural Credits Act of 1926 a number of the boards have secured finance through the Rural Credits Department of the Commonwealth Bank; others have obtained their finance from other banks.

In addition to obtaining finance from banks and other financial institutions such as assurance companies, marketing boards are empowered to make levies on growers.

(b) *C.O.D.*

The C.O.D. is financed by levies, freight margins, profits on agency business, merchandising, etc. Surpluses accruing from its various activities are returned to growers concerned by way of bonus on fruit supplied or business done.

The C.O.D.'s canneries are financed by direct subscriptions by growers, who are issued with interest-bearing debentures. Cannery finance is also obtained by loans from financial institutions, and these loans are, at

present, covered by Government guarantee to the extent of over £1,000,000.

Success or Failure?

There is no doubt that primary producers' co-operatives in Queensland, of both a voluntary and a semi-compulsory nature, have been successful. This is clearly shown by Tables 1 and 2. This success has been due to several factors—

- (a) Government legislation. Legislation has given wide powers to the various statutory bodies.
- (b) Government guarantees. Without Government guarantees it is probable that financial institutions would not have been prepared to provide the necessary finance for fixed and working capital.
- (c) Grower support. Growers have strongly supported their associations, both financially and by marketing their produce through their associations.

It is to be regretted that there are today some growers, albeit a minority, who fail to see the advantages of co-operation and complete support of their own institutions.

Co-operatives, voluntary and semi-compulsory, are brought into being at the express wish of growers: they are not forced on growers at the whim of Government. They are organised by growers for their own benefit, to ensure the grower gets a fair return for his labour, to ensure that the grower gets the maximum return for his produce, to ensure that the middleman cannot hold the grower to ransom.

Boards help to equalise returns to the grower over a period of time. They are effective in ironing out excessive rises and falls in price, which are as unwelcome to the producer as to the consumer. Long-term security is preferable to transitory quick returns. The maintenance of quality standards is essential if we are to maintain and increase the consumption of our products. Marketing boards provide facilities for grading and classifying their commodity, thereby ensuring a high uniform standard, in the interests of both producer and consumer; they can provide high quality seed for sowing and ensure the availability of seed, and are in a position, with the approval of growers, to contribute to research in the interests of the particular industry.

QUEENSLAND SHOW DATES, 1957.

JULY

Charters Towers, 1-3
Bowen, 3-4
Nambour, 4-6
Ayr, 5-6
Brookfield, 6
Maleny, 12-13
Townsville, 8-11
Ingham, 12-13
Gatton, 12-13
Cleveland, 12-13
Innisfail, 18-20

Redcliffe, 19-20
Rosewood, 19-20
Cairns, 24-25
Mt. Gravatt, 26-27
Atherton, 29-31

AUGUST

Lawnton, 2-3
Home Hill, 2-3
Tully, 3
Collinsville, 2-3
Mossman, 2-3
Brisbane, 8-17
Beaudesert, 22-24
Cooroy, 31
Rocklea, 30-31
Wondai, 30-31
Canungra, 31